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ABSTRACT

Prepared for conference participants, this document is comprised of three parts: (1) Part A reviews the achievements since the UNISIST Intergovernmental Conference of 1971 and provides background information for their assessment; (2) Part B deals with the general problem of the flow and utilization of scientific and technological information and its role in development; and (3) Part C sets out ideas and suggestions that could facilitate the shaping of strategies for future action at the national, regional, and international levels, and underlines some of the main issues. Provided at the beginning of the document is an Executive Summary, intended to assist the conference in focusing its discussion on the main concepts and issues raised. Appended are a glossary of terms and a table defining acronyms. (Author/JD)

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UNISIST II

Paris, 28 May-1 June 1979

MAIN WORKING DOCUMENT

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INTRODUCTION

The Intergovernmental Conference on Scientific and Technological Information for Development (UNISIST II) is being convened by Unesco in accordance with resolution 5/10.1/1 adopted by the General Conference of Unesco at its twentieth session. The purpose of the Conference is set out in the Approved Programme and Budget for 1979-1980 as follows: "The Conference, which will review developments since the UNISIST Intergovernmental Conference of 1971, will make recommendations on future activities in scientific and technological information and will contribute to the United Nations Conference on Science and Technology for Development (UNCSTD)" (20 C/5 Approved, paragraph 5117).

The main working document has been drawn up according to a plan which follows items 6.1, 6.2 and 6.3 of the provisional agenda of the Conference and hence comprises the following parts:

Part A which reviews the achievements since the UNISIST Intergovernmental Conference of 1971 and provides background information for their assessment;

Part B which deals with the general problem of the flow and utilization of scientific and technological information and its role in development; and

Part C which sets out ideas and suggestions that could facilitate the shaping of strategies for future action at the national, regional and international levels and underlines some of the main issues.

An Executive Summary is given at the beginning of this document to assist the Conference in focusing its discussion on the main concepts and issues raised.

The preparatory work on this main working document began as part of the implementation of the Approved Programme and Budget for 1977-1978 (19 C/5 Approved, paragraph 5013) and took into account the guidance provided by the Intergovernmental Council for the General Information Programme at its first session, 21-25 November 1977.

At its first session (30-31 January 1978) the Bureau of the Intergovernmental Council for the General Information Programme outlined the objectives of the Conference and agreed to the establishment of a Conference Programme Committee to aid the Secretariat in its preparation.

This Committee, which elected as Chairman, Sir Harry Hookway, Chief Executive of the British Library, discussed at its first session the main themes of the Conference and the preparation of the working document.

The initial preparatory measures for the Conference were reviewed by the Bureau of the Intergovernmental Council when it met from 4 to 6 July 1978.

At its second and third sessions (6-7 September 1978, and 30-31 January 1979) the Conference Programme Committee examined the draft working document at successive stages of its preparation.

This document was finalized by the Secretariat, in the light of the recommendations of the Committee.

The preparatory work also involved a number of consultations with different information specialists and organizations and their comments have been given due attention in the drafting of the text.

This working document, however, makes no claim to being exhaustive of all the issues. Its main purpose is to help the delegates of Member States to prepare themselves for the Conference, to facilitate discussion and to highlight certain problems on which the Conference might consider it useful to recommend action that could be taken at the national regional and international levels for the promotion of scientific and technological information for development.

Valuable assistance was received during the preparation of this document from the Chairman of the Conference Programme Committee, Sir Harry Hookway, and its members: Professor E.S. Ayensu, Mr. F.W. Baker, Dr. L.G. Burchinal, Dr. P. Lazar, Dr. V.V. Sychev and Professor Dr. I. Wesley-Tanasković, and special consultants: Mr. A. Adu, Professor M. Dayal, Mr. C. Keren, Mrs. J. Marton-Lefèvre, Mrs. M.F. Morin, Professor J.-C. Pecker, and Miss D. Torrijos.

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EXECUTIVE SUMMARY

SUMMARY OF PART A

What is UNISIST?

1. UNISIST was established within Unesco as an intergovernmental programme to stimulate and guide voluntary co-operation in the flow of scientific and technological information at the national, regional and international levels. The programme was launched on the basis of recommendations made by a first Intergovernmental Conference held in 1971 which was convened to consider the results of a three-year feasibility study conducted jointly by Unesco and the International Council of Scientific Unions (ICSU).

2. In November 1972, the General Conference at its seventeenth session authorized the establishment of the UNISIST programme with the following goals:

- to advance and co-ordinate the world trends towards information-sharing and co-operative agreements among governments, international organizations and operating information services;
- to provide guidance and catalytic action for the necessary developments in the field of scientific and technical information;
- to facilitate the access of scientists, engineers and technologists to published information;
- to help the developing countries meet their needs for scientific and technical information;
- to take the necessary measures for the establishment of a flexible world network of information systems and services based on voluntary co-operation.

3. Parallel to the concern of promoting international communication among scientists and engineers which has remained a constant preoccupation of UNISIST there has evolved, in response to the changing needs of Unesco's Member States and the emergence of the goals of the New International Economic Order an increasing emphasis on supporting activities in scientific and technological information to accelerate the development process and a mission orientation.

4. The principles on which the quests and formulations for co-operation of UNISIST are based are applicable to all fields of human knowledge and not to the scientific and technological fields only.

5. In pursuing this mission, the UNISIST programme has been strengthened by its merger, following the nineteenth session of the General Conference of Unesco in 1976, with Unesco's programme for development of documentation, libraries and archives to form the General Information Programme under the responsibility of the Assistant Director-General for Studies and Programming.

6. The General Information Programme is guided by a 30 member Intergovernmental Council and an Advisory Committee of information specialists and users.

7. Since its earliest days, Unesco has had provisions for consultation and co-operation with international non-governmental organizations within its fields of programme interest. Unesco benefits by expert consultation in its programme planning and execution and gains an operational resource for the conduct of studies and the creation of useful products.

8. Of special importance to UNISIST has been co-operation with the International Council of Scientific Unions (ICSU) and its specialized bodies including the Abstracting Board (ICSU/AB), the Committee on Data for Science and Technology (CODATA) and the Committee on Science and Technology for Development (COSTED); the International Federation for Documentation (FID); the International Organization for Standardization (ISO); the World Federation of Engineering Organizations (WFEO); the International Federation of Library Associations and Institutions (IFLA); the International Council on Archives (ICA) as well as the International Committee for Information and Documentation in the Social Sciences.

9. The General Conference at its eighteenth session in 1974 approved the reorientation of Unesco's medium-term planning in terms of broad social objectives. One of the areas adopted in the Organization's Medium-Term Plan for 1977-1982 is Objective 10.1, Development and promotion of information systems and services at the national, regional and international levels. The work to be undertaken under this objective by UNISIST and the General Information Programme has been distributed under five "themes":

- promotion of the formulation of information policies and plans (national, regional and international);
- promotion and dissemination of methods, norms and standards for information handling;
- contribution to the development of information infrastructures;
- contribution to the development of specialized information systems in the fields of education, culture and communication, and the natural and social sciences;
- promotion of the training and education of specialists in and users of information.

What is scientific and technological information?

10. In the conference document certain basic terms are used as follows:

"information" is the content or message of a written or oral communication or discourse;

"scientific information" is information arising from or pertaining to research activities, usually in the natural and social sciences. The research may be basic or applied; it may be exploratory, observational or experimental;

"technology" is scientific, engineering, managerial and other knowledge necessary to produce the goods and services needed by society;

"technological information" is information pertaining to technology.

11. Scientific information and technological information are thus interdependent and often carried by the same or similar media - books, periodicals, reports, etc. Also, they are used together in development-catalysing activities. Hence, the phrase "scientific and technological information" (STI).

12. Development also requires economic, social and cultural information, for example, population and commercial statistics. Such forms of information are also included in the usage of the document, especially when the term "information" is used instead of "scientific and technological information".

13. A glossary of technical terms used is found in Annex I of the Conference document.

Review of programme achievements

14. The review in Part A of UNISIST's accomplishments since 1971 will permit representatives of Member States to evaluate how effectively the programme has responded to their needs and been able to react to changing requirements; it also provides background against which to formulate recommendations concerning possible new directions for the programme. A serious effort was made in the review to identify difficulties and shortfalls encountered in the execution of the programme as well as impacts and achievements. The review has been arranged by the structure of "themes" under Objective 10.1 of Unesco's Medium-Term Plan for 1977-1982.

- Programmes for the promotion of formulation of information policies and plans

15. An increasing number of Member States, in particular developing countries, are coming to realize that information is both a national and international resource for development and that its systematic acquisition, organization and utilization require the formulation of a national information policy and plan in close association with national development policy.

The UNISIST programme has tried to assist with the following actions:

16. National focal points and committees. In 1973, Unesco proposed to Member States that they should establish national focal points, responsible for questions of national information policy formulation, planning and co-ordination, and UNISIST national committees, responsible for liaison with UNISIST. While the wisdom of designating national focal points with the functions described by Unesco has been widely recognized, Member States have had varied results in implementing the recommendation. The difficulties encountered in some of the 54 national focal points established to date have resulted from location in the governmental structure, the low priority and support sometimes given to information service development, the existence of strong sectoral information interests, and confusion generated by the establishment of multiple "focal points" for participation in various international systems.

17. The 46 UNISIST national committees have on the whole been more successful in defining national positions for UNISIST meetings than in their contribution to programme activities.

18. Guidelines for national policy formulation. The programme has issued series of guidelines designed to assist in the formulation of information policies and planning and there has been considerable demand for copies. However, their use in practice may have been reduced by inadequate awareness by potential users, and insufficient relevance to the broader aspects of national development planning.

19. Efforts to associate UNISIST with national and regional development policy. UNISIST has sponsored two types of meetings focused on policy formulation and planning. A series of three international meetings involving representatives from industrialized and developing countries was devoted to broad issues common to both groups in policy formulation, information management and coping with technological change. A principal value appears to be the opening of discussions between experts from developing and industrialized countries on topics of mutual concern. The second type has involved the exploration of regional co-operative programmes involving networking, resource sharing, manpower development, as well as the exchange of experience on the formulation of information policy and planning. The contributions of these meetings and their impact on national and regional policy development have varied. The dialogue generated among professionals contributes in the long run to technical co-operation; but increasing emphasis on the generation of a dialogue between socio-economic planners and policy-makers on the one hand and information specialists on the other has not yet been optimally achieved in the meetings because of insufficient representation of the first group.

20. Efforts to overcome legislative, administrative and economic obstacles to information flow. Obstacles to the flow of information across frontiers and within Member States are yet to be fully identified although research in overcoming impediments has been a feature of the UNISIST programme from its inception. While some appropriate steps to overcome them are certainly within the purview of UNISIST, collaboration with other agencies working on these problems is necessary.

- Programmes developed to promote the establishment of norms and their dissemination

21. Standardization is essential to the international exchange of scientific and technological information and normative activities have figured prominently in the UNISIST programme. Normative action is by its nature a slow process, and especially difficult in rapidly developing technological fields where special interests dominate. Nevertheless, the UNISIST successes achieved in association with other bodies are noteworthy.

22. Guidelines and manuals of practice. A series of working groups has been instrumental in the preparation of specialized materials. Although UNISIST began its work with norms and standards for machine-readable data bases and computer-assisted information systems, it soon took up additional areas of wide interest in library and information activities such as construction of thesauri, bibliographical description and presentation of data. The use of these in libraries and information centres, not only for systems interconnection, but also for achieving consistency and economy in library and information operations, has demonstrated their value. Challenges still exist in resolving long-standing differences between the library and information communities in the area of bibliographic descriptions. A still wider application of these norms and standards can result only from an active liaison with libraries and information centres and services and the widespread use of the texts in the teaching of library and information science courses.

23. Specialized systems and centres. Five centres set up in Member States to assist in co-ordinating development in specialized areas of information transfer (terminology, thesauri and classification schemes, equipment for information handling and bibliographic descriptions) are associated with UNISIST. In addition, the French Government houses and provides major support for the International Centre for the International Serials Data System (ISDS), an intergovernmental system concerned with the identification of serial publications and the assignment of International Standard Serial Numbers (ISSN). These bodies have had a clear impact on international bibliographic and information activities.

24. Relationships with international non-governmental organizations. Of particular importance to the standardization activities has been the productive, co-operative relationship with ISO and its Technical Committees. Achieving the increased participation of experts from developing countries in standardization activities has been a goal for UNISIST. A close working relationship has also been maintained with other organizations, notably ICSU-AB and FID and in recent years IFLA, in particular its Universal Bibliographic Control (UBC) Office.

- Programmes for the development of information infrastructures

25. Information infrastructure connotes that complex of institutions, organizations, resources and systems and services which support flow and delivery of information from the generator to the users. Some countries have had time and resources to develop these mechanisms; many developing countries, lacking them, are at a disadvantage. The advisory and governing bodies of the UNISIST programme have consistently attributed a high priority to the development of information infrastructures.

26. In the early years of the UNISIST programme activities under this theme promoted the design and development of scientific and technological information systems and services. With the establishment of the General Information Programme the range of activities was broadened to encompass co-ordinated national information systems, including libraries and archives covering not only science and technology but other sectors as well.

27. The programme includes many activities which, while in fact components of national and regional information systems, sometimes provide the impression of being isolated activities with little relevance to the major objectives of UNISIST. However, it has always been recognized that before many developing countries could reasonably hope to derive full benefit from UNISIST, there was need for the establishment of basic services as a necessary substructure for the more advanced information handling programmes.

28. In the implementation of the programme, it is necessary to use elements on information policy formulation, norms and standards and manpower questions developed by UNISIST as well as other relevant, internationally accepted guidelines, standards and procedures. The resulting compatibility will encourage the establishment of the world network of collaborating systems and services foreseen at the conception of the UNISIST programme.

29. In review, the principal actions undertaken could be placed in the following categories:

30. Co-ordinated national information systems. Due to limited funds, only a limited number of pilot projects leading to the establishment of co-ordinated systems of information or important components such as various types of libraries, archives or scientific and technological information services can be financed under Unesco's

Regular Programme budget. However, provision is also made for advisory services to Member States which wish to embark on these activities using national or extra-budgetary resources.

31. Many additional projects designed to strengthen infrastructural components are funded from Unesco's Participation Programme, from the United Nations Development Programme (UNDP) or through a fund-in-trust arrangement. The forms of assistance most commonly employed are expert or consultant services, equipment for demonstration, training, often in the form of fellowships, and contributions to the organization of seminars or meetings.

32. Introduction of new technologies. Several pilot projects have helped to examine the suitability of new technological developments for utilization in developing countries. Selective Dissemination of Information (SDI) systems have been set up in several countries and on-line access to remote data bases has been demonstrated. Other activities aimed at standardizing methodologies and techniques have been carried out in varied fields including processing bibliographic information and the establishment of restoration and reprographic laboratories.

33. Regional and international activities. The UNISIST programme is associated with a current project promoted by IFLA towards the Universal Availability of Publications (UAP) expected to ameliorate the difficulty experienced in developing countries in obtaining the textual material required. Efforts to support networking activities have been undertaken in a number of regions. Special emphasis has been placed on developing activities in co-operation with CODATA to stimulate the establishment of facilities for processing numerical scientific data and information analysis centres. The importance of ensuring Technical Co-operation among Developing Countries (TCDC) is stressed in the interest of long-term economy in national information systems development through networking and resource sharing.

- Contribution to the development of specialized information systems in the fields of education, culture and communication and the natural and social sciences

34. In order to accommodate sectoral information activities making a contribution to Objective 10.1 of Unesco's Medium-Term Plan (1977-1982), a special theme has been established. While Unesco's sectoral systems such as the Science and Technology Policies Information Exchange System (SPINES) in the Science Sector and the Data Retrieval System for the Social and Human Sciences (DARE) in the Social Sciences Sector subscribe to UNISIST principles; budgeting and management rest with the sectoral authority; the UNISIST role has been consultative and advisory. Co-ordination is facilitated through the Unesco Intersectoral Committee for Co-ordination of Activities in the Field of Information.

- Programmes designed to promote the training and education of professionals and users of information

35. The shape of the programme in this area has been strongly influenced by the recommendations of the Ad Hoc Committee on Education and Training Policy and Programme as endorsed by the advisory and governing bodies of UNISIST and the General Information Programme. The long-term goal is to build up in each country or viable homogeneous region the facilities needed for education and training of information specialists. In the short-term, it has been recognized that there is an urgent need for access to facilities outside national or narrowly regional boundaries, either for basic professional courses or for short courses for updating or specialization. In organizing activities, there has been an effort to stress

the use of Unesco's funds as "seed money" for activities which can be hoped to have a "multiplier effect". The formulation of policy in education and training has been reflected in the issue of a series of guidelines.

36. Harmonization and co-ordination of programmes. A number of practical mechanisms for approaching the problem of harmonizing programmes of a wide range of assistance agencies and organizations were identified at a meeting of funding agencies held in 1978. Earlier progress in this area is evidenced by the participation as contractor or co-sponsor with Unesco of a large number of agencies and organizations in a wide range of activities.

37. Establishment of national and regional programmes. The building up in a number of Member States of basic facilities for education and training has been advanced by consultant missions for planning the improvement of institutions and teaching programmes and the organization of regional meetings as forums for discussion of education and training needs in various disciplines. Support has been given in such forms as fellowships and provision of supplementary teaching staff in special subject areas to developing regional institutions.

38. Teaching materials for information specialists. The preparation of teaching materials adapted to the requirements of developing countries, which has been the objective of a modest programme, is emerging as a pressing need and a serious study is to be made during 1979 for the identification of priorities.

39. Preparation of teaching staff. The training of teachers continues to be assigned very high importance and a number of special courses have been organized for this purpose. Further assistance has been given in the form of fellowships for advanced training in educational methods and professional studies.

40. Courses, seminars and workshops. Significant steps have been taken towards filling the special needs of managers of information services and specialists in various branches of information work through the organization, often in co-operation with other agencies, organizations or institutions, of a considerable number of intensive regional and international courses and seminars. These short courses deal with precisely defined subjects and are aimed at very specific audiences.

41. Promotion of users education. The recommendations of international seminars on the problem of training users of scientific and technological information organized during 1976 have heavily influenced subsequent programme actions. These include the publication of a guide for teachers working in this field and work on the preparation of guidelines for developing a national plan for training in information use.

The UNISIST programme and the United Nations system

42. In order to improve their performance and productive capacity, many members of the United Nations family have launched and supported a variety of information systems and programmes, some intended to assist internal co-ordination and others to meet the needs of Member States. Not surprisingly, there has been overlapping and duplication of effort.

43. The UNISIST programme from its inception has provided advice and support to a number of these information systems and has, as one of its principal objectives, the harmonization of information activities including those within the United Nations system.

44. Under the authority of the United Nations Administrative Committee on Co-ordination (ACC), an Inter-Organization Board for Information Systems (IOB) was created to co-ordinate information programmes. IOB and UNISIST have complementary goals and a closer working relationship was established in 1978. It is envisioned that a joint programme now being developed will be implemented over the next few years.

SUMMARY OF PART B

45. The principal aim of Part B is to examine the role of information in development against a background of rapid economic and social change. It is essentially a summary of an existing situation and, although it raises many significant policy issues, they are not set out for discussion in this part. The intention is that discussion of Part B of this document under item 6.2 of the provisional agenda, should mainly centre on the experience of Member States, at various stages of development, in relating the development of information systems and services to the needs of the various users engaged in development. The hope is that this exchange of experience - and of lessons from the experience - will not only be valuable in itself but will also contribute to the discussion, under item 6.3 of the provisional agenda, of strategies for future action at the national, regional and international levels.

46. Part B has been conceived as follows:

Consideration will first be given, in section II, to the scientific and technological information flows within the system formed by scientific and technological activities. These flows are evidence of the role of scientific and technological information in the development of science and technology and in the dissemination of knowledge and research findings among users who are themselves scientists, engineers and technicians. In the national State organization, such flows are chiefly dependent on the science and technology policy. Nevertheless, as this policy is part of the more general framework of development policy, the information flows specifically concerned with scientific and technological activities are an aid to development in that they result in the attainment of the scientific and technological goals pursued by the science policy having regard to the economic and social priorities of society.

47. The next stage, in section III, will be, from a more advanced level of integration, to study information flows in the highly complex and diversified system of development activities. Some of the information involved is scientific and technological, and some pertains to other fields. All decisions taken at all levels - including the level of local authorities - and leading to development programmes and operations, are affected by these flows of information.

48. These programmes and operations deal, in particular, with two very important aspects of development in the various countries, namely industrialization, which entails the transfer of appropriate technology and assimilation of imported technology, and rural development, which is based on the techniques of land and water utilization, agriculture and stock rearing, and is oriented in terms of people's aspirations and abilities. The problem is to combine the different flows of information to make it possible for messages to be employed by users from a wide variety of professional fields whose needs are very different from those of scientists and technicians. For many of these users, the use of primary sources of scientific and technological information is meaningless since they are not engaged in science- and technology-building activities.

49. Lastly, consideration will be given to the implications for the flow of scientific and technological information of the considerable development of modern communication and information technology as a result of progress with computers. These developments open the way to improvements in the world-wide flow of information between countries with high scientific potential and those whose scientific potential is still limited, with a view to achieving mutually dependent development, in keeping with the goals of the New International Economic Order.

SUMMARY OF PART C

50. Part C deals with some of the major issues arising from Part B and sets out initial thinking on national, regional and international strategies for action concerning these issues.

51. When the findings of the review of achievements since the UNISIST Conference of 1971 (Part A) are coupled with the focus on the role scientific and technological information plays in the development process (Part B), there emerge arguments for a need for both continuity and change in Unesco's approach to the issues. The original UNISIST objectives, the UNISIST international conceptual framework and the programme priorities continue to be relevant. Adjustment and new emphases are needed to respond to development problems and aspirations of Member States.

52. Dealing with these broad issues involves first the basic problem of identifying information requirements for development, followed by that of developing information policies and programmes that can satisfy identified needs. Next are presented the related issues of promoting the effective use of information, the twin problems of providing access to external sources and of developing information services within a country, followed by the ways in which modern technology can be harnessed to help solve these problems. Legal, administrative, economic and linguistic obstacles to the flow of information present a final group of issues. Co-operation among countries and the role of Unesco within the international community furnish additional considerations for strategies for action.

53. The full text of the issues, presented at the end of each chapter of Part C to assist the Conference in focusing its discussion and in formulating recommendations, is reproduced below.

54. Because the actions proposed for discussion represent in many instances adjustments or new emphases, rather than radical departures from past approaches, it has been found necessary to present the issues in some detail in order to indicate their innovative aspects.

ISSUES RELATING TO THE NEED FOR CHANGE AND CONTINUITY IN UNESCO'S STRATEGIES FOR ACTION

In the light of the review of achievements since the "UNISIST" Intergovernmental Conference of 1971 (Part A) and the focus on social and economic trends in the emerging nations, the recognition of the fundamental role scientific and technological information plays in development, the important progress achieved in information technology, and the factors affecting the programme's environment (Part B) the Conference may wish to confirm:

(a) the continuing relevance of the original UNISIST objective for facilitating the flow and utilization of scientific and technological information as laid down in Unesco's Medium-Term Plan for 1977-1982;

(b) the continuing relevance of UNISIST as a conceptual framework for information system and services development at the national, regional and international levels;

(c) the continuing validity of the priorities set up in Member States for Unesco's programme in scientific and technological information;

(d) the need for new emphases and adjustments and additional strategies in Unesco's information programme, as well as additional strategies for action at the national, regional and international levels to respond to the development needs of Member States, and contribute to the development of science and technology and their application to development and to the establishment of the New International Economic Order.

ISSUES RELATING TO INFORMATION REQUIREMENTS FOR DEVELOPMENT

1. In the light of the growing awareness that scientific and technological information is a major factor for accelerating the development process and the recognition that identification of information requirements is the first step towards successfully applying information to development, the Conference may wish to examine the difficulties encountered by Member States in arriving at a clear understanding of how information can best be applied to serve development and how the information requirements for development can effectively be determined.

2. In discussing actions related to these issues which may be undertaken at the national level, the Conference may wish to consider whether:

first major steps for establishing the national information requirements for development should be based on an identification of development goals, short and medium term; establishment of national programmes of action for their realization should include: (a) identification of types of information users, present and future, who can make a contribution to national development; and (b) determination of the types of information and information services needed for the various types of users (as compared to existing services). Appropriate policy decisions and actions should follow to acquire, organize, give access to and utilize scientific and technological information to serve national development plans.

3. The Conference may also wish to consider the strategies and actions to be undertaken at the international and regional levels, related to these issues, and in particular whether:

(a) the strategy in UNISIST should be user-oriented. Continued emphasis should be given to the needs of scientific and technological communities since science and technology, through use of information, produce new knowledge for development. But, in addition, new emphasis should be given to the information needs of all categories of users contributing to development and special attention assigned to the need for evaluated, consolidated and repackaged information, data and documentation;

(b) Unesco should encourage existing and future national, regional and international information systems and services as well as international intergovernmental and non-governmental information programmes and organizations, to be user-oriented;

(c) Unesco should assist Member States, at their request, in determining their national information requirements for development based on national development goals, and should prepare the necessary guidelines and make available the required expertise in order to assist Member States in carrying out the complex tasks described under 2 above.

ISSUES RELATING TO INFORMATION POLICY, PLANS AND PROGRAMMES

1. Recognizing that information policies and plans constitute an essential and inseparable part of national policy for economic and social development, the Conference may wish to discuss, among other things, how information policies and programmes can best be drawn up, harmonized and implemented to serve the development process.

2. In discussing actions which may be undertaken at the national level, the Conference may wish to consider whether:

(a) in the dynamically changing environment, there is a priority need for recognizing information as a national and international resource for development; its acquisition, handling and effective utilization require the formulation of harmonized national information policy and plans in close association with national development policy in order that these countries be able to: (i) improve the flow and utilization of information within and outside the countries in development-catalysing activities; (ii) strengthen their capability in information system planning and development; and (iii) utilize international assistance resources effectively;

(b) the national information policy should emphasize the importance of having plans and programmes provide for the scientific and technological information needs of the entire society - from the development planning, policy-making, programme implementing

groups through the research and development and professional groups in all sectors, to people at large, all of whom are, in one way or another, involved in the development process. Policy and plans should cover the whole range of information infrastructures, the complex of institutions, organizations, resources and systems and services including libraries and archives, which support the flow and delivery of information to satisfy the needs of each individual user;

(c) it is desirable to designate a national information co-ordinating agency (national focal point) where one does not exist. It should be located high in the government structure and assigned responsibility for the harmonized planning, co-ordinating and management of the national information system. The agency would among other things: advise the government on the formulation of the national information policy and its implementation; ensure that the national information policy and plan form an integral part of the national development policy and plan; advise on the constitution of information committees; advise on the criteria, guidelines and standards for planning, development, financing and assessing performance of the components of the information system; establish mechanisms to ensure adequate input to the system in terms of manpower, finance, facilities; advise on and interact with international and regional information programmes and the co-ordination of their activities in the country;

(d) in national information policies, more attention needs to be given, especially in developing countries, to information manpower development as well as to research in the field of information so as to enhance the quality and image of available professional human resources.

3. In discussing strategies and actions at the international and regional levels, the Conference may wish to consider whether:

(a) the UNISIST guidelines on information policy and planning should be closely linked to the relevant aspects of national development planning and enlarged to cover the information requirements of a very broad array of users including policy-makers, planners and managers in areas of national development; specialists involved in research, development and application; and the grass-roots level;

(b) the guidelines should analyse the functions of national focal points and UNISIST national committees and, taking into account the broader scope needed, should explain the structure, location and functions of such agencies and committees;

(c) Unesco should continue to catalyse national and regional information policy development, giving particular attention to the need to associate policy-makers, development planners and information professions. Experiences in Member States in formulating and implementing national information policies and plans, closely related to national socio-economic development plans, should be pooled and diffused;

(d) in providing assistance to Member States, Unesco should ensure that projects for developing individual infrastructure components fit into and contribute to the development of the total national information system, and enhance the national capability in information systems design and operation;

(e) Unesco, in association with other international organizations, may encourage and support the development of networks of corresponding specialists to facilitate the flow of information (e.g. the population information correspondents network of the ESCAP region);

(f) Unesco's information programme should also be conducive to enhancing the image of the information professions and contributive to the development of documentation and library, information and archival sciences;

(g) special efforts should be deployed to explair, diffuse, make available and better known in as many languages as possible the many publications, guidelines, recommendations, methods, norms and standards existing or being prepared relating to UNISIST.

ISSUES RELATING TO THE EFFECTIVE USE OF INFORMATION

1. In the light of the review presented in this chapter and the experience of Member States, the Conference may wish to discuss ways and means of promoting use of information to contribute to national development, identifying the problems encountered in Member States in utilizing this information effectively and suggesting strategies and activities for national, regional and international action.

A. Use of information by development planners and policy-makers

2. In discussing national level strategies and actions, the Conference may wish to consider the need for Member States to develop programmes to enhance the utilization and appreciation of existing information sources by development planners, policy-makers, programme administrators and other decision-makers. These programmes may include:

(a) the compilation of surveys and case studies to produce firm evidence of the ways in which information has been used to minimize duplication of effort, bring financial rewards from timely information and open up new lines of work and other innovations;

(b) the organization of short appreciation sessions to different planning and programming groups in such fields as agriculture, industry, energy, national and State economic development, accentuating specific problems of interest to invididual groups;

(c) the adaptation of existing systems and services and the establishment of new ones to meet the specific needs of development planning and policy-making.

3. In discussing strategies and actions at the international and regional levels, the Conference may wish to consider whether:

Unesco, in co-operation with appropriate bodies should initiate, support and provide guidance for (a) surveys and case studies of the type mentioned in 2 (a) in different countries, for (b) the organization and conduct of appreciation sessions including the preparation of materials as mentioned in 2 (b), and for (c) improving information facilities for development planners, policy-makers and managers.

B. Promotion of information-use skill

4. In discussing actions which may be undertaken at the national level to promote information-use skill, the Conference may wish to consider whether:

(a) since present STI systems and services are used by only a small proportion of potential users, including scientists, engineers, educators, technicians, governmental staff and the general public, and since improved information-use capability could greatly increase efficiency and effectiveness in many areas of endeavour and make a positive contribution to socio-economic development, urgent and large-scale action is necessary to promote information-use education and training, formal and out of school, at various levels and for all classes of STI users;

(b) in view of the fact that in many developing countries over 40 per cent of the population is made up of people below 15 years of age, particular attention is needed to teach this group to become information conscious.

5. In discussing actions related to those issues which may be undertaken at the international and regional levels, the Conference may wish to consider whether:

(a) Unesco, in co-operation with appropriate national and international organizations, could extend its user training programme to develop suitable syllabi, information-use packages and guidelines for conduct of information-use courses for a variety of user groups, paying particular attention to the requirements of personnel involved in extension activities;

(b) Unesco and other organizations concerned with education could pay attention to the need to develop information-use capability in children and young people, and develop appropriate training packages to this end;

(c) whenever Unesco supports development of school library facilities in Member States, the information-use skill development concept could be introduced as an integral part of the effort.

ISSUES RELATING TO IMPROVING ACCESS TO INFORMATION

With a view to ensuring access by Member States to scientific and technological information needed to contribute to the development of science and technology and their application to socio-economic development, the Conference may wish to examine ways and means to improving such access by discussing the many issues raised under the following headings: A. Universal information services; B. Information and transfer of technology; C. Local information services and endogenous development; D. Experimental data, data centres, information analysis centres and critical reviews; E. Development planning data and information; and F. Scientific and technological information transfer to and from grass-roots level. In discussing strategies and actions at the national, regional and international levels, under each one of these headings, the Conferene may wish to consider the following statements and proposals:

A. Universal information services

1. Implications at the national level

(a) Member States need easy and timely access to universal as well as local sources of scientific and technological information to serve their socio-economic development plans. Access to government records and archives, bibliographic information, data, documents and consolidated and repackaged information should be ensured.

(b) To provide access to universal sources of scientific and technological information, Member States should set up one or more referral centres, with trained personnel, to organize, develop and manage a national referral network and provide a link with international referral networks and international information systems.

2. Implications at the international and regional levels

Unesco, in the framework of UNISIST, should:

(a) assist Member States gain better access to universal sources of scientific and technological information by taking steps to:

(i) increase awareness of existing international sources of information;

(ii) overcome problems of international flow and communication of information;

(iii) diminish restrictions on the international flow of computer-readable material; and

(iv) study with developing countries and producers of scientific and technological information sources, the problems related to cost and time;

(b) in close collaboration with IFLA, continue to assist in developing the Universal Availability of Publications (UAP) and encourage the development of related co-operative international efforts in this area;

(c) encourage and facilitate the effective participation of the developing countries in international co-operative information services and in the management of international information services in order to increase their relevance to the development problems of the international community;

(d) make a concentrated effort to give guidance, prepare appropriate material and guidelines, assist Member States to organize their referral networks at the national or regional levels and help them in the training of qualified manpower for this function;

(e) continue its harmonization efforts to ensure effective bibliographic control for both the library and information and documentation communities.

B. Information and technology assessment, transfer and adaptation

3. At the national level

Technology assessment, transfer and adaptation is a key factor in achieving national development objectives. Appropriate steps should be taken to provide the national machinery in charge of technology development and transfer with the information which will facilitate the selection, transfer and adaptation of imported technology to the development goals and the social, economic and cultural life of the country. Information is needed on alternative sources of technology, data on similar national and foreign transactions and relevant legislation and practices, nominal costs of technology transfer transactions (payment for the right to use patents, know-how, trademarks, etc.) as well as the real costs of those transactions (technical assistance, price of raw material, return or investment, management, etc.).

4. At the international and regional levels

Unesco, within the framework of UNISIST, should collaborate closely with Member States, international and regional organizations and in particular with the agencies of the United Nations family to assist developing countries establish appropriate information mechanisms to deal with the transfer of technology; these could include

national or regional data banks of transfer and development of technology, information services on alternative sources of technology and patent information services.

C. Local information services and endogenous development

5. At the national level

(a) Endogenous development capability being a prerequisite to achievement of self-reliance, it is essential that information systems and services not merely facilitate information flow within and from outside the country, but also sustain and promote endogenous development and the capacity to innovate. National institutions and services in the field of science and technology which provide the setting for endogenous development should be supported by information systems and services which maximize the use of local information resources, stimulate the demand for locally-generated knowledge, identify indigenous resources, know-how and capabilities and provide registers of indigenously-developed technology as well as registers of research and development projects in progress.

(b) Member States should make effective use of existing social and economic information contained in the administrative and programme records of national and local governments. The establishment and support of modern records management and archival services will assure that statistical and quantitative data obtained in government records past and present, will be readily available to planners, decision-makers and the administrations in meeting both current and future needs in planning and implementing development programmes.

6. At the international and regional levels

(a) Unesco should study and analyse, in collaboration with some developing countries the way in which information systems and services have successfully supported and enhanced endogenous development and should make the evaluated results available to all Member States. Relevant guidelines should be prepared in due time.

(b) Unesco's programme for records management and archival development (RAMP), which is intended to assist Member States in developing modern information services encompassing government records and archives, should be given particular emphasis because of the direct contribution it can make to development.

D. Experimental data, data centres, information analysis centres and critical reviews

7. At the national level

In view of the importance of reliable experimental and observational data in problem-solving, computation and scientific research and the fact that data in some subject fields may be generated in a number of scattered institutions and research groups, such data have to be collected, evaluated and compiled for easy use within the country and in regional or international data banks. It is therefore essential that more concerted efforts be made to:

(a) identify specific areas of interest (to each country) in which data evaluation and compilation and development of data centres and information analysis centres are necessary;

(b) train scientists (including social scientists and economists) specialized in the subject areas concerned, in data evaluation and compilation;

(c) organize data evaluation and compilation groups in appropriate national centres of excellence in the relevant subject fields;

(d) make available internationally the products and facilities of the centres based on an appropriate pricing policy.

8. At the international and regional levels

Unesco, in the framework of UNISIST, should:

(a) in association with ICSU/CODATA, WFEO and other appropriate bodies, support and organize more frequently than in the past, short national and regional training courses, in data generation, selection, evaluation, compilation and distribution, and on data centres development and management as well as on information consolidation and repackaging, development of information analysis centres and services that provide critical reviews and literature surveys;

(b) in association with appropriate international and regional bodies (ICSU, WFEO, International Social Science Development Council, etc.) organize short courses for specialists in the preparation of critical reviews of various types, in recognition of the fact that critical reviews of the state-of-the-art and trends in subjects of specific interest to a country or region are becoming increasingly important, especially in interdisciplinary areas due to the burgeoning of information and complexity of the fields;

(c) in association with appropriate bodies, prepare guidelines, manuals and teaching kits for use in courses of the type mentioned in (a) and (b);

(d) in association with appropriate international and regional organizations, assist and guide in the establishment of data centres and information analysis centres and the promotion of intra-regional co-operation in developing product-oriented data centres.

E. Development planning data and information

9. At the national level

Recognizing the importance of easy and prompt access to statistical, plan and forecast data and information on a variety of economic, social, cultural, regulatory and other questions to facilitate decision-making and effective planning for development, it is essential that adequate attention be given:

(a) to identifying and profiling sources of generation and flow of relevant data and information in the various sectors of government, in research, development and academic institutions and in private organizations within the country, as well as relevant information located in other countries and in international and regional organizations;

(b) to organizing and processing data and information (reports, memoranda data sheets, computer output, etc.), when feasible, in centralized archives or information centres for easy access and use;

(c) to establishing appropriate linkages, collaboration and information and data flow among these organizations;

(d) to ensuring compatibility in the information processes and products of the different organizations through the adoption and use of nationally and internationally approved standards and norms;

(e) to training information specialists in such tasks;

(f) to developing appropriate management information systems, as part of modern records management and archival services.

10. At the international and regional levels

Unesco, within the framework of UNISIST and in association with other organizations, could assist Member States in the actions mentioned in 9 by: (a) providing experts to advise on the means, methods and procedures to be adopted; (b) by developing norms, standards and guidelines appropriate for the purposes, when these do not already exist; (c) by organizing short courses and workshops on specialized information handling tasks; (d) by organizing short appreciation courses for the officials of the organizations concerned on the need for the facilitation of data and information capture, organization and flow. Programmes for 9 (c), (d) and (e) can be implemented on a regional basis wherever viable and advantageous.

F. Scientific and technological information transfer to and from grass-roots level

11. At the national level

(a) In view of the important role of extension and allied contact services personnel as well as the mass media in communication and transfer of STI information between development programmes management and people at the grass-roots level as well as among the people at the grass-roots level, the Member States should make their national information systems responsible for:

(i) providing consolidated and repackaged scientific and technological information material;

(ii) making scientific and technological information sources and facilities accessible to extension services personnel and the mass media;

(iii) identifying, collecting, recording and disseminating information on traditional indigenous know-how;

(iv) identifying information needs of people at the grass-roots level;

(v) providing information-use education to personnel involved in extension and allied services and the mass media;

(vi) providing information on current development plans and projects to extension services personnel, and the mass media for wider dissemination.

(b) Appropriate agencies, such as government bureaux for extension services and mass media should:

(i) study the existing flow and utilization of scientific and technological information by extension personnel and mass media with a view to identifying problems and bottlenecks;

(ii) compile outlines of courses in extension services, technology transfer and development support communication, including mass media with a view to introducing appropriate information-use topics into them.

12. At the international and regional levels

Unesco, within the framework of UNISIST, in collaboration with appropriate national and international agencies should: (a) prepare guidelines to assist national efforts on items 11 (a) and (b) above; (b) assist in conducting surveys mentioned under 11 (b); and (c) support the preparation of teaching packages and guidelines for the training of extension services and development communication personnel.

ISSUES RELATING TO USE OF INFORMATION TECHNOLOGY

1. In the light of the growing potential for the application of advanced information and communication technology to develop useful and versatile information systems and services and in view of the increased needs and demands for such systems and services, the Conference may wish to examine ways and means to create better awareness of the advantages and potentialities of information and communication technology in developing environments and suggest strategies and actions which may assist Member States in selecting and applying this technology to the development of national information systems adapted to the social, economic and cultural life of each country and responding to its needs.

2. In discussing actions related to these issues which may be undertaken at the national level, the Conference may wish to consider whether:

experience has shown that if carefully chosen and applied, information and communication technologies can facilitate access to and utilization of information in developing countries, Member States should formulate appropriate national policies and plans for the introduction of information technology and build up necessary infrastructures for its effective utilization.

3. The Conference may wish to discuss appropriate actions to be undertaken at the international and regional levels and in particular it may wish to consider whether:

(a) in association with appropriate organizations Unesco should continue to support and organize in developing countries and regions demonstrations of the application of information and communication technologies; where a level of interest and viability are perceived, further assistance and guidance should be given to install facilities, manpower training and initiate operations that can benefit the country as a whole and where possible, neighbouring countries as well. The experience should be carefully evaluated and the results shared among Member States;

(b) in assisting Member States to build their infrastructures and introduce modern information technology, greater effort should be made internationally to adapt and use the guidelines, tools, methods, norms and standards developed under UNISIST in order to build in the national information systems the compatibility which will allow more effective exchange of STI at the national, regional and international levels;

(c) advisory missions and technical assistance programmes carried out in response to requests for introducing information technology or otherwise improving information infrastructures should be evaluated. Follow-up actions should receive more attention, and these activities should constitute a feedback mechanism to reflect in future projects carried out under UNISIST the needs and requirements of Member States;

(d) international action is needed to set up appropriate mechanisms for the periodic collection and evaluation of data on information technology applications, including hardware and software specifications, and their adaptation to the solution of information problems, especially in developing countries;

(e) guidelines should be developed by Unesco in collaboration with appropriate organizations on the application of information technology in library and information systems; the guidelines should indicate the factors to be taken into account in (i) determining viability and priority areas of application of information technology in different environmental conditions; (ii) selecting hardware and software and developing local software; (iii) selecting norms and standards and the adaptation of existing ones for special situations relating to scripts, languages, name designations, bibliographical descriptions, etc.; (iv) developing interfacing mechanisms; (v) organizing relevant training programmes for systems design, operating staff and users;

(f) in association with Member States and non-governmental organizations, such as FID, IFLA and ISO, Unesco should organize a sustained campaign to promote the wide utilization of norms and standards which will facilitate the flow of information and the rational utilization of information technology. In addition, the suitability of UNISIST guidelines and tools for system interconnection for the developing countries should be explored and the means for rendering them adaptable to a variety of local conditions should be investigated. Attention should be given to the preparation of simpler and more practical application guidelines to norms and standards;

(g) UNISIST activities in training and education of information specialists and users should pay increased attention to (a) educational programmes in information technology, including guidelines, norms and standards; (b) user training in the utilization of modern information technology; and (c) manpower forecasting in relation to the introduction of telecommunication, computers, reprography and other information-related technology;

(h) Unesco in the framework of the UNISIST programme should sponsor the preparation of comprehensive, easy to read publications for large-scale diffusion among policy-makers and planners to explain in non-technical terms the wide range of modern information technology available, and the need for standards, methods and normalized tools for building modern and effective information systems and networks at the service of development.

ISSUES RELATING TO OBSTACLES OF INFORMATION FLOW

1. With regard to legal, administrative, economic and linguistic obstacles to the flow of information, the Conference may provide an opportunity for sharing experiences among Member States on ways to minimize these obstacles and indicate measures which could be taken through existing national, regional, and international mechanisms to gradually solve these problems.

2. In discussing national level strategies and actions, the Conference may wish to address recommendations to Member States to give their full attention to elucidating the obstacles to the flow of scientific and technological information within the country and with other countries and take the necessary measures to minimize these obstacles.

3. Regarding actions at the international and regional levels, the Conference may wish to consider whether:

   (a) since confidentiality of information, copyright restrictions and pricing of services are as they are perceived from one angle among the administrative, legal and economic constraints to STI flow and utilization, Unesco, in association with appropriate agencies, should contribute to the examination in depth of the several issues involved, and collect and disseminate information on the different approaches and practices adopted in and among different countries. Such studies should include an investigation of policies and practices regarding access to government records and archives. In due course, guidelines on generally acceptable common practices might be drawn up;

   (b) in association with governmental and non-governmental agencies at the national and international levels, Unesco should assist Member States in minimizing the legal, administrative and economic constraints to access and utilization of STI within a country and between countries;

   (c) in addition to its catalytic role and specific programme action to facilitate the international flow of STI, it is desirable that Unesco prepare periodically a global state-of-the-art and trend report of the information scenario in all its aspects, at the national, regional and international levels, highlighting the new influences, developments, obstacles and problems - as a service to all those concerned with information transfer in science and technology and their application to development.

ISSUES RELATING TO REGIONAL CO-OPERATION ESPECIALLY AMONG DEVELOPING COUNTRIES

1. In the framework of the policies and needs of the Member States and the purpose and spirit of the New International Economic Order, the Conference may wish to examine how regional co-operation in the field of scientific and technological information could be expanded, intensified and better adapted to national needs, so that Member States, in regions with common problems and challenges, may closely co-operate in this field to achieve their national development goals.

2. In discussing actions related to the strengthening of regional co-operation which may be undertaken at the initiative of Member States, the Conference may wish to consider whether:

(a) in developing national and regional information programmes and systems, it is desirable that whenever viable, advantage be taken of bilateral and multilateral co-operative and collaborative arrangements in the economic, social, cultural, scientific and technological areas;

(b) in developing national and regional information programmes and systems, a Member State may seek the co-operation of other Member States in sharing experiences, resources, facilities and expertise in the spirit of the Buenos Aires Plan of Action for Technical Co-operation among Developing Countries (TCDC);

(c) developing countries should systematically exchange information pertaining to the transfer of technology for the benefit of development (terms and conditions of technology transfer, foreign investments, legislation and practices, activities of transnational corporations, criteria for selection of technologies, experiences, etc.).

3. The Conference may also wish to discuss appropriate actions to be undertaken at the international and regional levels to ensure that the needs and aspirations of Member States in scientific and technological information in various regions are appropriately reflected in the planning and programming of the international and respective regional organizations. In particular, the Conference may wish to consider whether:

(a) in planning and implementing its programme actions in scientific and technological information at the national, regional, or international levels, Unesco should endeavour to reinforce the Buenos Aires Plan of Action for TCDC and more particularly should ensure, wherever appropriate, that advantage be taken of existing or envisaged bilateral and multilateral arrangements for co-operation in the social, economic, cultural scientific and technological areas;

(b) Unesco should promote investigative studies to be carried out with appropriate organizations on the environmental conditions, (technological, social, political, legislative, economic and cultural) that are conducive to fruitful intra-regional and inter-regional co-operation in information and share the experience among interested Member States.

ISSUES RELATING TO UNISIST AND THE UNITED NATIONS SYSTEM, THE INTERNATIONAL AND REGIONAL INTERGOVERNMENTAL (IGOs) AND NON-GOVERNMENTAL ORGANIZATIONS (NGOs)

A. UNISIST and the United Nations system

1. With regard to Unesco, the Conference will doubtless wish to indicate the measures which should be taken to reinforce the Organization's current role in harmonizing information activities within the United Nations family. In the light of past experiences and in the context of changing environment and information needs, the Conference may wish to consider whether Unesco, through UNISIST, and in collaboration with appropriate organizations, can usefully continue:

(a) to initiate appropriate actions and play a catalytic role in the design and development of United Nations information systems;

(b) to provide a conceptual framework for the design and operation of other international information systems and to establish linkages among them;

(c) to provide for the evaluation of international information systems;

(d) to assist Member States in contributing to, participating in, and profiting from international information systems;

(e) to assist in problem solving and undertake joint investigations and programmes with other United Nations agencies in the S & T information field;

(f) make a major contribution to the follow-up of UNCSTD regarding programmes and actions for scientific and technological information at the service of development.

B. UNISIST and the international and regional intergovernmental and non-governmental organizations

2. On the basis of past experience and respecting the autonomous interests and goals of international and regional intergovernmental (other than the United Nations system) and non-governmental bodies, the Conference may wish to consider whether Unesco, in the framework of UNISIST, can usefully:

(a) continue and intensify co-operation with the NGOs and IGOs in the implementation of its programme at the national, regional and international levels;

(b) assist in technical problem solving and undertake joint investigations and projects in appropriate topics in the information field;

(c) provide a conceptual framework for the design and operation of information systems which the NGOs and IGOs may develop;

(d) contribute to the development of the professions represented in the NGOs.

PART A

ACHIEVEMENT SINCE THE UNISIST INTERGOVERNMENTAL CONFERENCE OF 1971: A REVIEW

I. EVOLUTION OF THE UNISIST PROGRAMME

What is UNISIST?

1. UNISIST was established within Unesco as an intergovernmental programme originally designed to stimulate and guide voluntary co-operative actions by Unesco Member States, and by non-governmental organizations to facilitate access to and international flow and exchange of scientific and technical information.

2. The UNISIST programme had its origins in the late 1960s when the International Council of Scientific Unions (ICSU) and Unesco became concerned that uncoordinated efforts in the handling of scientific and technical information were jeopardizing the traditions of international exchange of scientific information.

3. The proposals of the three-year (1968-1970) Unesco-ICSU feasibility study were considered by an Intergovernmental Conference in October 1971. The recommendations and priorities expressed by Member States at the Conference gave the programme its initial set of objectives and structure. The programme was launched in 1973 after the General Conference at its seventeenth session, November 1972, approved the plans presented to it.(1)

4. Despite early use of the terminology, "UNISIST - World Scientific Information System", UNISIST was from the beginning conceived as a long-term programme intended to stimulate, facilitate and guide development of and co-operation among scientific and technical information services at the national, regional and global levels. The principles on which its quests and formulations for co-operation are based are applicable to all fields of human knowledge and not to the scientific and technological fields only.

5. Science information had been defined as "information essential to the advancement of science in its basic, applied and technological contexts".

6. In the words of the Feasibility Study Report,(2) UNISIST had as its broad principles:

"The unimpeded exchange of published or publishable scientific information and data among scientists of all countries.

Hospitality to the diversity of disciplines and fields of science and technology as well as to the diversity of languages used for the international exchange of scientific information.

Promotion of the interchange of published or publishable information and data among the systems, whether manual or machine, which process and provide information for the use of scientists and engineers.

The co-operative development and maintenance of technical standards in order to facilitate the interchange of scientific information and data among systems.

(1) See 17 C/Resolution 2.131 in, UNESCO GENERAL CONFERENCE, seventeenth session, Paris, 1972. - Resolutions and recommendations. - Paris: Unesco, 1973. - 218 p. - (Records; volume 1.)

(2) Study report on the feasibility of a world science information system. - Paris: Unesco, 1971, p. 1-2.

Promotion of compatibility between and among information processing systems developed in different countries and in different areas of the sciences.

Promotion of co-operative agreements between and among systems in different countries and in different areas of the sciences for the purpose of sharing work-loads and of providing needed services and products.

Assistance to countries, both developing and developed, which seek access to contemporary and future information services in the sciences.

The development of trained manpower and of resources of published information and data in all countries as necessary foundations for the utilization of machine systems.

The increased participation of scientists in the development and use of information systems, with particular attention to the involvement of scientists in the evaluation, and synthesis of scientific information and data.

The involvement of the coming generation of scientists in the planning of scientific information systems of the future.

The reduction of administrative and legal barriers to the flow of scientific information between and among countries.

The principles here enunciated are basic for the improvement of the international flow of scientific information".

Goals and priorities of UNISIST

7. The UNISIST programme had its origins in a period of "unprecedented technological change with many implications for development. Among the industrialized countries, the burgeoning of "Big Science" during the 1960s had been paralleled by an unco-ordinated development of information systems and services, and many leaders in the international scientific community became concerned with the potential disorganization of the traditional exchange of scientific information. Furthermore, both Unesco, as an intergovernmental organization and ICSU as an international non-governmental organization, were dedicated to assisting developing countries build up their scientific and technological potential, and both were concerned with the problem of disparate abilities among these countries to gain access to and use scientific and technical information.

8. The UNISIST Intergovernmental Conference of 1971 recommended that "special attention be paid to the complex and urgent needs of the developing countries and in particular their need for scientific and technical, as well as economic and social information, for training... and for provision of adequate infrastructure, and for stimulating or initiating new systems when needed".(1)

9. In November 1972 the General Conference at its seventeenth session(2) authorized the establishment of the UNISIST programme with the following goals:

"(a) to advance and co-ordinate the world trends towards information sharing and co-operative agreements among governments, international organizations and operating information services;

(1) See p. 18 in, INTERGOVERNMENTAL CONFERENCE ON THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM, Paris, 1971. - Final report. - Paris: Unesco, 1971. - 60 p. - (SC/MD/25).

(2) See 17 C/Resolution 2.131 in, UNESCO. GENERAL CONFERENCE, seventeenth session, Paris, 1972. - Resolutions and recommendations, op. cit.

(b) to provide guidance and catalytic action for the necessary developments in the field of scientific and technical information;

(c) to facilitate the access of scientists, engineers and technologists to published information;

(d) to help the developing countries meet their needs for scientific and technical information;

(e) to take the necessary measures for the establishment of a flexible world network of information systems and services based on voluntary co-operation".

10. These goals have remained constant during the life of the programme. They served as well as a basis for the structure used in preparing the biennial programme and budget.

11. Within this programme structure, however, a certain number of shifts in priorities have been made. Two areas, those contributing to the development of information infrastructures and to education and training, have consistently maintained their pre-eminence, the training of information users was added to the latter in 1977 as a new element. Increasing importance has come to be attached to the area of promotion of policy formulation and planning at the national, regional and international levels. One objective, originally called "Improving Tools of Systems Interconnection" and now designated as the "Promotion and Dissemination of Information Methods, Norms and Standards" while no longer assigned the very top priority it once had, has, along with Promotion of Information Policies and Plans, been given "special importance" by the Intergovernmental Council "as a prerequisite for successful implementation"(1) of the programme as a whole.

Factors shaping the programme

12. While the Intergovernmental Conference assigned initial priorities, a variety of factors have contributed to further shape the UNISIST programme.

13. The points of view of individual Member States have been communicated to Unesco through correspondence and contacts with permanent delegations. Staff missions to Member States have provided insights which have helped to design activities to meet their needs. Additional valuable material has been received through replies to formal questionnaires distributed to Member States.

14. Also of importance to the shaping of the programme are the discussions and debates of working groups, ad hoc committees, symposia and other groups of specialists.

15. Other proposals are made by the international non-governmental organizations (NGOs) enjoying consultative status with Unesco. Since its earliest days, Unesco has had provisions for consultation and co-operation with international non-governmental organizations within its fields of programme interest spelled out in Unesco's Manual(2) as "to advance the purposes of Unesco by securing the maximum

(1) See p. 20 in, INTERGOVERNMENTAL COUNCIL FOR THE GENERAL INFORMATION PROGRAMME, 1, Paris, 1977. - Final report. - Paris: Unesco, 1978. - 39 p. - (PGI.77/CONF.201/Col.1/Council 1).

(2) See Directives concerning Unesco's relations with international non-governmental organizations, p. 155, in, Manual of the General Conference. - Paris: Unesco, 1977. - 166 p.

co-operation from international non-governmental organizations in the preparation and in the execution of its programme and thus increasing international co-operation in the fields of education, science and culture".

16. Unesco benefits by expert consultation in its programme planning and execution, and gains an operational resource for the conduct of studies and the creation of useful products. The non-governmental organizations, in addition to receiving in certain cases subventions, gain foci for their own programme development, an opportunity to exert a professional influence in an intergovernmental programme, and prestige both for the organization and for its individual experts.

17. Of special importance to UNISIST has been co-operation with the International Council of Scientific Unions (ICSU) and its specialized bodies including the Abstracting Board (ICSU/AB), the Committee on Data (CODATA) and the Committee on Science and Technology for Development (COSTED); the International Federation for Documentation (FID); the World Federation of Engineering Organizations (WFEO); the International Federation of Library Associations and Institutions (IFLA); the International Council on Archives (ICA) as well as the International Committee for Information and Documentation in the Social Sciences. Some of their specific contributions are described under the relevant objectives in Chapter II which follows.

18. The influential role played by the UNISIST Advisory Committee and the Advisory Committee for the General Information Programme established in 1977 deserves special mention and frequent reference is made elsewhere to the importance of the UNISIST Sterring Committee and its successor, the Intergovernmental Council of the General Information Programme, in guiding the planning and implementation of the programme.

19. Important recommendations have been formulated by the Executive Board and a full expression of the views of Member States has been made during the debates of the General Conference on the biennial programmes and budgets.

20. Certain policy decisions of general importance adopted by the General Conference have had a marked effect on UNISIST. Thus, the General Conference at its eighteenth and nineteenth sessions adopted resolutions on Unesco's contribution to the establishment of a New International Economic Order which called for the intensification of efforts to assist developing countries gain broader access to scientific knowledge.(1)(2) In a resolution on the Second Development Decade, the General Conference drew attention to the need to strengthen mechanisms for the exchange of "development-significant scientific and technological information as a key component in the process of transfer and adaptation of technologies appropriate to the needs of developing countries".(3) In response to these policy directives, special attention has been given in subsequent programme development to Unesco's contribution to the establishment of a New International Economic Order, to the implementation of the Second Development Decade, and to the needs of the least developed countries.

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(1) See 18 C/Resolution 12.11 in, UNESCO. GENERAL CONFERENCE, eighteenth session, Paris, 1974. - Resolutions. - Paris: Unesco, 1975. - 226 p. - (Records; volume 1.)
(2) See 19 C/Resolution 9.11 in, UNESCO. GENERAL CONFERENCE, nineteenth session, 1976. - Resolutions. - Paris: Unesco, 1977. - 182 p. - (Records; volume 1.)
(3) See 19 C/Resolution 9.21 in, Resolutions, op. cit.

Emergence of a development mission

21. The foregoing discussion of the influences on the UNISIST programme provides a necessary background for the assessment of the adequacy of the programme's response to the needs of Member States. These needs may not only be variously interpreted but change with time. The changing needs have brought about an evolution of programme priorities. Flexibility of programme response to changing environment is a proper measure of its success.

22. Conceived initially, primarily as a programme designed to improve communications among natural scientists at the international level, and secondarily as a programme designed to support economic and social development, UNISIST is now increasingly concerned with scientific and technological information as these serve the development process. It is this association with development as a broad social objective which provides a new mission orientation for UNISIST.

23. This is not to say that the programme has been or should be conducted exclusively for the benefit of the developing countries. All countries have set goals for development, and scientific and technological information, whether generated in an industrialized country or in a developing one is a resource for all. The UNISIST role has been to assist in the creation, accessibility and use of that resource. Historically, it has been the industrialized countries which have been responsible for the creation of this resource, and which have accounted for the bulk of its use. Many of the developing countries, lacking until recent times the infrastructure to make extensive use of information, have had little opportunity to gain access to it, and apply it for their development purposes. It is the correction of this imbalance which underlies the priority accorded to developing countries in Unesco's overall policy, as in that of the other United Nations agencies. It is perhaps worth reiterating that in fulfilling the new demands on Unesco, the original UNISIST principles basic for the improvement of the international flow of scientific information will in no way be compromised.

Governance and administration of UNISIST

24. Another factor in the evolution of the UNISIST programme was the long-standing question as to whether Unesco's information programmes should be structured by sector or by function.

25. Responsibility for the conduct of the UNISIST programme was assigned at its outset to the Division of Scientific and Technological Information and Documentation in Unesco's Science Sector. Provision was made for an intergovernmental Steering Committee composed of the representatives of 18 Member States designated by the General Conference and an Advisory Committee nominated by the Director-General made up of scientists, engineers and information specialists.

26. In an effort to co-ordinate the sectoral information programmes, the Director-General had established in 1966 a Department of Documentation, Libraries and Archives (DBA) which included responsibility for the development of information infrastructures. The recommendations of the Intergovernmental Conference on the Planning of National Documentation Library and Archives Infrastructures (NATIS),(1) organized by DBA in 1974 overlapped those of the UNISIST Intergovernmental Conference of 1971 and there was also some duplication in the successive programmes for the two units as approved by the General Conference.

(1) INTERGOVERNMENTAL CONFERENCE ON THE PLANNING OF NATIONAL DOCUMENTATION, LIBRARY AND ARCHIVES INFRASTRUCTURES, Paris, 1974. - Final report. Paris: Unesco, 1975. - 67 p. - (COM/MD/30).

27. Following a mandate of the General Conference at its eighteenth session an effort was made to resolve this problem. After consultation with Member States and with the help of expert advisers, the Director-General submitted a proposed solution (19 C/42) to the nineteenth session of the General Conference (1976).(1) The Conference endorsed this plan which called for the establishment of a General Information Programme (PGI) based on a merger of the earlier programmes.

28. The Division of the General Information Programme which reports to the Assistant Director-General for Studies and Programming was set up in February 1977. A governing structure composed of an Intergovernmental Council (30 members) and an Advisory Committee for the General Information Programme replaced the former UNISIST Steering and Advisory Committees. It is the role of the Council to guide the planning and implementation of the General Information Programme in the interests of the development of education, culture, science and technology. The retention of the name "UNISIST" was recommended by the General Conference for appropriate use.

29. The creation of PGI has brought a number of benefits: it has reduced the number of inconsistencies in Unesco's dealings with Member States on matters relating to information transfer; it has brought together experience in infrastructure development and education and training and has provided for an integrated approach to information systems planning and development covering libraries and archives as well as scientific and technological information. Some members of the scientific community have regretted that the UNISIST programme has been shifted from its former base in the Science Sector. Reviewing, a two-year period of operation, however, the Unesco Executive Board and the General Conference at its twentieth session in 1978 have expressed satisfaction with the results of the merger of the programmes.

Relationship with other Unesco sectors and programmes

30. The "extension" of UNISIST to other fields than the natural and applied sciences had been actively discussed by the Study Committee. The unity of human knowledge, and the fact that all fields were caught up in the communications revolution, and that most often, at national level, development in all sectors was called for, were strong arguments in favour of broadening the scope of the programme; the wisdom of taking the first steps in the sciences which had strong traditional institutional provisions for information transfer led the Committee to propose deferral of the programme's extention.

31. The social sciences were the first area beyond the natural and applied sciences to which it was felt the UNISIST principles might be applied. This step had been initially proposed by the International Committee for Social Science Information and Documentation in 1971. In 1973, shortly after the programme was formally established, Unesco assembled a group of consultants, and based on their recommendation, a meeting of experts in social science documentation was held in June 1974.(2) The eighteenth session of the General Conference authorized the Director-General to "encourage international co-operation in the social sciences through improved information and documentation services... by developing the social science component of UNISIST".(3) Responsibility for this development is retained in Unesco's sector of the Social

(1) UNESCO. GENERAL CONFERENCE, nineteenth session, Nairobi, 1976. Report of the Director-General on the overall information programme. - Paris: Unesco, 1976. - 34 p. - (19 C/42).

(2) MEETING OF EXPERTS ON THE PROBLEMS AND STRATEGIES OF INCORPORATING THE SOCIAL SCIENCES INTO THE WORLD SCIENCE INFORMATION SYSTEM, St. Raphael, France, 1974. - Final report and recommendations. - Paris: Unesco, 1974. - 16 p. - (SHC.74/CONF.609/20).

(3) See 18 C/Resolution 3.211 in, UNESCO. GENERAL CONFERENCE, eighteenth session, Paris, 1974. - Resolutions, op. cit.

Sciences and their Applications. The second session of the Ad Hoc Committee on Social Science Information is expected in 1979 to formulate recommendations on the pursuit of the overall programme of Social Science Information and Documentation and to ensure its optimal integration with the General Information Programme.

32. In order to accommodate sectoral information activities making a contribution to the Transfer and Exchange of Information objectives, a new "theme" "Contribution to the development of specialized information systems in the fields of education, culture and communication and the natural and social sciences" was added in the Programme and Budget for 1979-1980.(1) Links and arrangements for co-operation between UNISIST and Unesco's sectoral information programmes have been maintained.

33. The ease with which the UNISIST programme objectives were accommodated during a major shift in Unesco's medium-term planning is noteworthy. The General Conference at its eighteenth session in 1974 approved the reorientation of the Organization's medium-term planning towards broad social objectives, which often cut across Unesco's established sectors (education, science, culture and communication, social sciences). One of the areas adopted was "Transfer and Exchange of Information",(2) Chapter 10 of Unesco's Medium-Term Plan for 1977-1982. The clarity with which the UNISIST objectives had been originally expressed is generally credited as a source of programme strength; their clarity also contributed to the easy adaptation of the UNISIST programme to the requirements of planning by objectives. The Programme and Budget for 1977-1978 (19 C/5) was the first to be built on this principle, with "sub-objectives" (or "themes" in the Programme and Budget for 1979/1980) keyed to Objective 10.1, "Development and promotion of information systems and services at the national, regional and international levels", within Chapter 10.

II. REVIEW OF PROGRAMME ACHIEVEMENTS

Introduction

Purpose of the review

34. In the resolution of the first UNISIST Intergovernmental Conference of October 1971, Unesco's Member States called upon the Director-General "to convene periodically an Intergovernmental Conference to approve a long-term plan for UNISIST, and to review and evaluate the progress of the UNISIST programme".(3)

35. Programme reviews can be made for a variety of purposes: to measure progress, or the lack of it, toward the realization of predetermined goals; to estimate whether the benefits of programme actions outweigh the costs; or simply to assess the adequacy of managerial competence. Elements of all of these approaches may enter in this review.

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(1) Approved Programme and Budget for 1979-1980. - Paris: Unesco, 1979. - XXI, 625 p. - (20 C/5 Approved).

(2) See Chapter 10 in, Medium-Term Plan (1977-1982). - Paris: Unesco, 1977. - 369 p. - (19 C/4 Approved).

(3) INTERGOVERNMENTAL CONFERENCE ON THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM, Paris, 1971, op. cit., p. 18.

36. However, a principal concern of the Member States at the first UNISIST Conference, and a dominant concern today is the assessment of the programme's contribution to economic and social development.

37. This review of UNISIST's accomplishments since 1973 presents an opportunity for the representatives of Unesco's Member States assembled in the UNISIST II Intergovernmental Conference to examine how well the programme has responded to their needs during the past six years, to measure its flexibility and resilience for meeting their changing needs; and to formulate recommendations concerning new directions which might be taken in future. The changing socio-economic scene and consequent changes in information needs in Member States, particularly developing countries, will be dealt with in Part B of the document; and proposals for strategies for future action will be presented in Part C.

Orientation of the review

38. The UNISIST programme as it was conceived, planned, debated and approved represented, in a large measure, a consensus among three groups which attended the first UNISIST Conference: scientists and engineers as producers and users of information, the information professions and the makers and administrators of public policy in Unesco's Member States. It is expected that the judgements and recommendations made at the UNISIST II Conference on Scientific and Technological Information for Development will again reflect a consensus of the thinking of these groups.

39. There are two additional factors requiring special attention: first, the present Conference is expected to provide input to the forthcoming United Nation's Conference on Science and Technology for Development; and second, since the first UNISIST Conference in 1971, a group of significant social, economic, scientific and technological changes have occurred which affect information needs, as well as information handling methods. These changes will be considered in Part B. Delegates to the Conference will need to bear in mind these factors in reviewing the achievements of UNISIST and judge its performance and future capability in the context of 1979 and not of 1971.

40. The assessment procedure used here does not follow a formal evaluation methodology. Rather, it consists of summaries of the evidence available in the UNISIST and General Information Programme documentation (especially in the Proceedings of the governing and advisory bodies of the programme), supplemented by correspondence and personal interviews with many participants in the programme. The ICSU Policy Group on Scientific Information (POGSI) has made available the results of its analysis of the UNISIST programme accomplished in 1976-1978.(1)

Review of programme achievements

41. The review is organized in the succeeding sections in conformity with the themes (subobjectives) of the Medium-Term Plan (1977-1982)(2) (19 C/4 Approved). In addition to the review of past accomplishments covering 1973-1978, highlights of the Approved Programme for 1979-1980(3) (20 C/5) are noted, so that UNISIST II conferees may have current information.

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(1) An evaluative study of UNISIST 1971-1976. - Paris: ICSU, 1978. - 11 p.
(2) Medium-Term Plan (1977-1982), op cit.
(3) Programme and Budget for 1979-1980, op. cit.

42. An effort has been made to outline programme strategy and to cite illustrative examples, rather than to list activities comprehensively. Fuller information on documents and publications issued as well as meetings and conferences organized or sponsored by the UNISIST programme may be found in a reference document prepared for the Conference.

Programmes for the promotion of formulation of information policies and plans

43. The need for a national policy on scientific and technical information rests on several premises:

(a) Information is both a national and an international resource for development, and its generation, processing, dissemination and utilization in all countries involve the expenditure of public funds in varying degrees and hence the need to determine priorities for resource allocation.

(b) Adoption of a policy by the government ensures a certain commitment and involvement of the government in the national information system development programme, an important consideration particularly in developing countries.

(c) Adoption of a set of policy objectives provides planners a checklist of factors to be taken into account in the national information infrastructure development, and the formulation of relevant projects and programmes.

(d) As experience has shown, a national information policy catalyses the national information infrastructure development, and facilitates collaboration of various agencies in the effort.

44. It is evident then that systematic planning of the national information system and the implementation of the plan through infrastructure development activities is greatly helped, especially in developing countries, by the formulation and use of a national information policy.

45. The UNISIST programme's approach for assisting Member States in information policy and planning has taken several forms.

National focal points and committees

46. The UNISIST Feasibility Study had recommended the establishment of a governmental or government-chartered agency at the national level "to guide, stimulate, and conduct the development of information resources and services in the perspective of national, regional and international co-operation. These agencies should...give their support, or themselves adhere to, co-operative programmes of international scope, in consonance with the principles and goals of UNISIST".(1)

47. In implementing this recommendation, Unesco proposed to its Member States that they establish (a) national focal points to be primarily concerned with questions of policy, planning and co-ordination of information system development at the national level, and (b) UNISIST national committees broadly representative of professional interests, to serve as national links to the UNISIST programme, monitoring and communicating its activities, supporting information projects, advising on and co-ordinating technical assistance activities, and achieving national positions on questions relating to UNISIST meetings. The functions of each of these agencies were spelled out in a Unesco communication of 28 July 1973.(2)

(1) Study on the feasibility of a world science information system, op. cit., recommendation 15.

(2) Establishment of national focal points and UNISIST national committees in Member States. - Paris: Unesco, 1973. - 10 p. - (CL/2297).

48. Recognizing the variations among the political and social structures of its Member States, Unesco provided guidelines for these bodies which permitted latitude for placement of the national focal point within the governmental structure. By 1978, 54 Member States had designated national focal points, and 46 had organized UNISIST national committees.

49. The concept of national focal points charged with a co-ordinating function was endorsed by the United Nations Expert Group on Information Exchange and the Transfer of Technology. While the wisdom of designating a national focal point with the functions defined by Unesco has been appreciated, Member States have had varied results in implementing this recommendation.

The reasons for this may be one or more of the following:

inappropriate designation or placement of the focal point in the government structure;

low priority assigned to information function, especially in developing countries, and hence inadequate support;

misunderstandings due to inadequate communication between Unesco and the Member States in respect of focal point's functions and activities.

50. Furthermore, other intergovernmental agencies have requested Member States to designate "national focal points" for operational participation in their information programmes (e.g. UNEP/IRS), and the NATIS Intergovernmental Conference had called on Unesco to assist Member States in the planning of their national information systems (NATIS) in such a way as to ensure co-ordination at the national level, two circumstances which added to co-ordination problems at the national level in Member States. While these problems have been reviewed at meetings of the Steering Committee and the Advisory Committee for UNISIST, and a proposal for a single agency for co-ordinating all information functions at the national level discussed at the PGI Intergovernmental Council, countries with highly developed sectoral information interests have not all welcomed the proposal. While UNISIST national committees have been helpful in the review of information policy issues and in defining national positions for UNISIST meetings; their contribution to UNISIST programme activities has been less effective. On its side, Unesco's provision for liaison with the national committees has been limited by insufficient manpower.

Guidelines for national policy formulation

51. In order to provide practical advice to Member States in information policy formulation and planning, a series of guidelines have been issued. Information Policy Objectives:[1] UNISIST Proposals, is a useful checklist for policy formulation and planning. Guidelines on the Planning of National Scientific and Technical Information Systems[2] provides ideas on pragmatic approaches. The document Information Policy and Planning for Economic and Social Development: A Dynamic Approach[3] prepared for regional information policy meetings restates policy questions in the light of cumulated experience.

(1) Information policy objectives: UNISIST proposals. - Paris: Unesco, 1974. - 26 p. - (SC.74/WS/3).
(2) Guidelines on the planning of national scientific and technical information systems. - Paris: Unesco, 1975. - 55 p. - (SC.75/WS/39).
(3) Information policy and planning for economic and social development: a dynamic approach. - Paris: Unesco, 1978. - 24 p. - (PGI/UNISIST/WA/1/3).

52. The demand for these has been considerable. However, their use in practice may have been limited for several reasons; non-awareness of the availability of the guidelines on the part of the planners; lack of coverage of all kinds of information systems and sources and the full range of potential information user groups; insufficient practical guidance in non-specialist language; insufficient relevance to broader aspects of national development planning.

53. The applicability of the guidelines on policy and planning to the social sciences was examined by the Ad Hoc Committee on Social Science Information.(1) and the need for modification and additional provisions was felt. Under the NATIS concept, guidelines were brought out on planning and development of national information systems. The suggestion that an integrated guideline covering the entire range of information provisions be prepared is under study.

Efforts to associate UNISIST with national and regional development policy

54. With the assignment of priorities to the needs of developing countries in Unesco's Medium-Term Plan 1977-1982, UNISIST assistance for national scientific and technological policy formulation took on more of a mission orientation.

55. This part of the programme was reorganized into two components providing guidance for the incorporation of information activities in national development plans. These were:

1. International problem solving meetings on broad issues.

2. Regional meetings focused on problems or circumstances generic to an area.

56. The first UNISIST Meeting on the Planning and Implementing of National Information Activities in Science and Technology held in Yugoslavia in 1976 on the theme: Information Policy for Development; National and International Responsibilities,(2) was followed by a second meeting on the Management of Information Resources at the National level, held in the Federal Republic of Germany in 1977, and by a third on The Implications of Modern Information Technology on National Information Policy and Planning(4) in Poland in 1979. These meetings, attended by representatives of national focal points in both industrialized and developing countries, were informally organized, and productive of vigorous discussion. A principal value appears to be the opening of a dialogue between experts from developing and industrialized countries on topics of mutual concern.

57. The regional meetings of experts on information policy and planning organized for South and Central Asia, South East Asia, Arab States and West Africa under the UNISIST programme have served as a basis for technical co-operation among the developing countries themselves. For example, the second regional meeting for South and Central Asia held in New Delhi, India,(5) in 1976 proposed the creation of a Standing Committee to consider implementation of co-operative regional programmes.

(1) Analysis of the applicability of the UNISIST guidelines to the social sciences. - Paris: Unesco, 1977. - 47 p. - (SS.77/CONF.607/3) Annex 1.
(2) Information policy for development: national and international responsibilities. - Paris: Unesco, 1976. - 50 p. - (SC.76/CONF.690/COL.8).
(3) Management of information resources at the national level. - Paris: Unesco, 1978. - 14 p. - (PGI.77/CONF.605/COL.3).
(4) The implications of modern information technology for national information policy and planning. - (In preparation.).
(5) UNISIST MEETING OF EXPERTS ON REGIONAL INFORMATION POLICY AND PLANNING IN SOUTH AND CENTRAL ASIA, 2nd, New Delhi, India, 1976. - Final report. - Paris: Unesco, 1976. - 21 p. - (ROSTSCA/UNISIST/II/17).

Such a committee has now been formed and met in Dacca, Bangladesh (1978).[1] Following the meeting, successful bilateral co-operation in manpower development efforts has been undertaken.

58. The first UNISIST Meeting of Experts on Regional Information Policy and Planning in South East Asia[2] (Bali, Indonesia, 1977) building on an earlier UNISIST initiative expressed support for a regional information network including information manpower development facilities and the need for a standing working group to facilitate co-operative effort.

59. Other regional meetings which served groups of Member States in their co-operative efforts to explore opportunities for common policy included the first UNISIST Meeting on Regional Information and Planning in West Africa (Accra, Ghana, 1978)[3] at which information activities were viewed in close association with the machinery for economic and social development of the region and the Meeting of Experts on the Development of Scientific and Technological Information Systems in the Arab States, (Paris 1978).[4] This latter meeting recommended various actions with a view to increasing government awareness of the importance of scientific and technical information for economic development and proposed that in the Arab States 3 per cent of the overall national budgets for research and development be allocated to the development of national scientific and technical information services.

60. These regional meetings, apart from the undoubted benefit of generating dialogue among planners and policy-makers and information professionals, represent a concerted effort by developing countries to assert their role as active participants in the global information programmes of Unesco.

61. Mention should also be made of the UNISIST Seminar on the Development of Iranian National Science Information Policy (Tehran, Iran, 1977),[5] convened at the request of the Iranian Government in co-operation with WFEO. The seminar provided visiting experts and local officials an opportunity of exploring information policy issues in depth and with particular reference to one country's needs. Participants in the UNISIST II Conference may note that several Member States, in replying to the Secretariat's questions relating to Unesco's Draft Programme and Budget for 1979-1980, expressed a desire for Unesco help in formulating their national information policies.

62. Experience in Member States in the formulation and implementation of national information policies and plans are now sufficient in number to be indicative and to form the basis for the development of models of national systems in different socio-economic environments. Means of pooling the experiences and developing models might be considered.

63. Wherever possible the regional meetings (e.g. South and Central Asia, and South East Asia) have been organized with the assistance and close collaboration of the respective Unesco Regional Offices. This has resulted in a more direst involvement of the Regional Offices in the national and regional information programmes of Unesco.

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(1) UNISIST MEETING OF THE REGIONAL STANDING WORKING GROUP ON INFORMATION POLICY AND PLANNING IN SOUTH AND CENTRAL ASIA, Dacca, Bangladesh, 1977. - Final report. - Paris: Unesco, 1977. - 17 p. - (ROSTSCA/UNISIST/WG/1).

(2) UNISIST MEETING OF EXPERTS ON REGIONAL INFORMATION POLICY AND PLANNING IN SOUTH EAST ASIA, Bali, Indonesia, 1977. - Final report. - Paris: Unesco, 1977. 34 p. - (UNISIST/ROSTSEA/I/7).

(3) UNISIST MEETING OF EXPERTS ON REGIONAL INFORMATION POLICY AND PLANNING IN WEST AFRICA, Accra, Ghana, 1978. - Final report. - (In preparation).

(4) MEETING OF EXPERTS ON THE DEVELOPMENT OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION SYSTEMS IN THE ARAB STATES, Paris, 1978. - Final report. - (In preparation).

(5) UNISIST SEMINAR ON THE DEVELOPMENT OF IRANIAN NATIONAL SCIENCE INFORMATION POLICY, Tehran, Iran, 1977. - Final report. - Tehran: Iranian Documentation Centre (IRANDOC), 1977. - 78 p.

Efforts to overcome legislative, administrative and economic obstacles to information flow

64. Research in overcoming impediments to the transfer and exchange of scientific and technical information has been a feature of the UNISIST programme from its inception. The improved technological facilities for information flow across frontiers and within Member States has occasioned increasing interaction with existing copyright and customs laws, as well as a need for pricing policies, and policies relating to the availability of currency for importation. Several of these problems are not exclusively inherent in the flow of information and are also being investigated in co-operation with other units of the Unesco Secretariat as well as through other bodies and conventions. Insufficient professional manpower in the Secretariat has greatly limited the extent of activities in this area.

Mindful of the many as yet unknown factors governing the transfer and use of information, the Secretariat undertook in 1977 a long-term project for the collection of statistical data relating to scientific and technical information flow and use internationally with a view to providing Member States with better tools to model and forecast future demand, supply and use of scientific, technical and social information.

Programmes developed to promote the establishment of norms and their dissemination

65. Unesco's interests in normative activities in the field of scientific communication antedate the UNISIST programme. The Organization's concern for scientific terminology, for standards for scientific journals and for improving scientific abstracts dates to its earliest years. Similarly, UNISIST's efforts to standardize bibliographic practices antedated the formal establishment of the programme. A Working Group on Bibliographic Descriptions was jointly organized by Unesco and the Abstracting Board of the International Council of Scientific Unions during the conduct of the Study. On its completion in 1970, the effort to standardize machine-readable information in scientific abstracts was continued by ICSU-AB with Unesco assistance.

66. The UNISIST Study Committee, impressed by the argument that computerization efforts should strive for compatibility so that the output of one system might be used without great conversion costs as input to another, assigned top priority in its report to programmes which concentrate on the technical aspects of systems interconnection. The UNISIST Intergovernmental Conference recommended that initially the programme "take measures for the compatibility of existing and future national, regional and international information systems",(1) and on the establishment of the programme, the development of "Tools for Systems Interconnection" was a priority programme objective.

Tools for systems interconnection

67. Under this rubric four types of UNISIST programme activities can be distinguished. These are:

(1) INTERGOVERNMENTAL CONFERENCE ON THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM, Paris, 1971, op. cit., p. 18.

the preparation and distribution of guidelines and manuals of practice;

the creation and maintenance of specialized centres and systems as well as institutionally-based activities;

the publication of inventories;

the support of exploratory activities relating to technical standards.

Guidelines and manuals of practice

68. The prototype project was the Reference Manual for Machine-Readable Bibliographic Descriptions[1] described above as a joint Unesco-ICSU-AB initiative. Initially conceived as a standardizing tool (format) for the exchange of machine-readable information processed by science abstracting services, an English version was published in 1974, and subsequently translated into French and Russian. Following its publication, three circumstances became apparent: first, there was a continuous need to revise and update and to promote its application; second, the parallel efforts of the library world to achieve international standardization for machine-readable bibliographic information produced in the cataloguing of books were developing rapidly; third, the Reference Manual came to be used not only as an exchange format for abstract information but also as a cataloguing tool. To provide for the continuous updating of the Reference Manual, UNISIST concluded a contract with the British Library to establish an International Centre for Bibliographic Descriptions (UNIBID). UNIBID is assisted by an international Advisory Committee in which major secondary services and libraries and library institutions are represented so as to ensure that the interests of both the information and library communities are reflected.

69. In an effort to achieve broader participation, a Working Group on Systems Interconnection was established to make proposals for a long-term standardization programme for the information and library communities. From this emerged the Working Group on Primary Sources of Information which completed its work by issuing several guidelines (Publishers' series,[2] Dissertations[3] Bibliography on the preparation and Presentation of Documents Containing Scientific or Technical Information)[4] and the Working Group on Bibliographic Data Interchange. The latter has now completed the preparation of a UNISIST Guide to Standards for Information Handling[5] (formerly the UNISIST Manual for Information Handling Procedures). This Guide contains standard and other normative material covering many aspects of the information transfer chain. On the basis of this Guide, it is planned to continue and intensify the standardization efforts. As a back-up service, UNISIST has initiated and assisted the International Organization for Standardization in the publication of a useful Standards

(1) Reference manual for machine-readable bibliographic description. - Paris: Unesco, 1974. - 71 p. - (SC.74/WS/20).

(2) Guidelines for the presentation of publishers' series. - Paris: Unesco, 1976. - 17 p. - (SC.76/WS/74).

(3) Guidelines for preparation of texts of dissertations for their presentation and publication. - Paris: Unesco, 1976. - 18 p. - (SC.76/WS/79).

(4) Bibliography on the preparation and presentation of documents containing scientific and technical information. - Paris: Unesco, 1974. - 183 p. - (SC.74/WS/21) - Draft.

(5) UNISIST guide to standards for information handling (In preparation.)

Handbook 1: Information Transfer[1] containing the texts of the most important international standards in the international field.

70. In the meantime, the programme for Universal Bibliographic Control (UBC), launched by IFLA with Unesco assistance, had brought into focus the need of the library community for standardizing machine-readable cataloguing. Within its UBC programme, IFLA published the International Standard Bibliographic Description for Monographs (ISBD(M)) and other standard descriptions for other forms of material as well as a general ISBD (ISBD(G)) to be used as a guide. To these International Standard Bibliographic Descriptions has been added the Universal MARC Format (UNIMARC) (1977). All of these are used by the library community for national bibliographic and cataloguing purposes and are maintained by the IFLA/UBC Office in London.

71. Thus, as both have tried to computerize their work, the library and the documentation communities have long been faced with the problem of merging their efforts to achieve standardization of bibliographic records in machine-readable form.

72. A UNISIST-sponsored International Symposium on Bibliographic Exchange Formats,[2] organized by UNIBID in co-operation with IFLA, ISO and ICSU-AB, held in Sicily in April 1978, assigned top priority to a co-operative effort involving all the organizations concerned to achieve a Common Communication Format (CCF). The Bureau of the Intergovernmental Council for the General Information Programme approved UNISIST's acceptance of a co-ordinating responsibility for a common communication format and assigned high priority to the creation of such a format. This was followed by a meeting of a UNISIST Ad Hoc Group on the establishment of a Common Communication Format (October 1978),[3] where an action-oriented programme was agreed upon. It appeared that despite long-standing divergencies, the two communities have accepted UNISIST's reconciling role and are making efforts to achieve a common format.

73. While this effort to provide guidance for the conversion of bibliographic information to machine-readable form has been a key-concern, other published guidelines, some of them of a highly-specialized character, have been accomplished. These include Guidelines for the Establishment and Development of Monolingual Thesauri,[4] and a second one for Multilingual Thesauri,[5] both prepared in close co-operation with ISO. The former has become an ISO Standard and is used by many organizations, national, international and intergovernmental, to construct manual- or machine-administered thesauri. The guidelines are considered as most useful in reducing the number of arbitrary variations among thesauri. As a complementary effort, Indexing Principles[6] have been developed which are now under consideration by ISO as an International Standard.

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(1) Information transfer: handbook on international standards governing information transfer (texts of ISO standards). - Geneva: International Organization for Standardization, 1977. - 516 p. - (ISO Standards Handbook; 1.).

(2) INTERNATIONAL SYMPOSIUM ON BIBLIOGRAPHIC EXCHANGE FORMATS, Taormina, Sicily, 27-29 April 1978. - Towards a common bibliographic exchange format? : proceedings/ edited by H. Dierickx and A. Hopkinson. - Budapest: OMKDK-Technoinform; London: UNIBID, 1978. - 214 p.

(3) MEETING OF THE AD HOC GROUP ON THE ESTABLISHMENT OF A COMMON COMMUNICATION FORMAT, Paris, 1978. - Summary report. - Paris: Unesco, 1978. - 14 p. - (PGI/CCF/I/1 Rev.).

(4) Guidelines for the establishment and development of monolingual thesauri. - Paris: Unesco, 1973. - 37 p. - (SC/WS/555).

(5) Guidelines for the establishment and development of multilingual thesauri. - Paris: Unesco, 1976. - 49 p. - (SC/76/WS/102).

(6) Indexing principles. - Paris: Unesco, 1975. - 10 p. - (SC.75/WS/58).

74. The Guide for the Presentation in the Primary Literature of Numerical Data Derived from Experiments[1] undertaken by ICSU's Committee on Data (CODATA), available in English, French, Spanish, Japanese, Swedish, German and Russian, is appreciated by the scientific community.

75. The application and use of the guidelines are generally difficult to assess. If they emerge as, did for example, the Guidelines for Editors of Scientific Journals,[2] from one or several workshops and already contain the proposals or experiences of many editors, including those from developing countries, a widespread use and acceptance is already guaranteed. For others, the setting up of suitable feedback mechanisms and training methods in their use are necessary.

76. Member State opinions about the UNISIST guideline publication programme vary. Critics have stated that they are too highly specialized and should be consolidated, that they are of irregular quality, or that they have not been adequately disseminated. On balance, however, they appear to be a useful contribution to the standardization of information handling practices, but need continuing supervision and updating.

Specialized systems and centres and institutionally-based activities

77. A network of international information centres was initially conceived as a mechanism for co-ordinating developments in specialized areas of information transfer; initially eleven centres were proposed, several of them at the initiative of Member States who viewed their establishment as a national contribution to UNISIST. Review by the Steering Committee led to the establishment of criteria for their acceptance and a reduction in their number. There are today one system and five centres associated with UNISIST: the International Serials Data System (ISDS); the International Information Centre for Terminology (Infoterm, Austria); the Clearinghouse for Thesauri and Classification Schemes (Poland), the International Clearinghouse for Equipment for Information Handling (Yugoslavia), the International Centre for Bibliographic Descriptions (UNIBID, UK), and the International Information Centre on Standards in Information and Documentation and related fields (ISODOC). Since several of these have normative functions, they are here reviewed together.

78. As early as 1971, the French Government offered to house and provide major support for the International Centre for ISDS, considered essential by the UNISIST Study Committee for the identification of all serial publications and the assignment of International Standard Serial Numbers (ISSN). A feasibility study was undertaken, and Guidelines for ISDS[3] prepared to assist Member States in the creation and running of national and/or regional centres.

79. While legal issues and initial technical problems delayed the formal establishment and operation of the International Centre, co-operation among national/regional centres has increased constantly. The system is now firmly established as an intergovernmental activity with a General Assembly and a Governing Board as control organs; as of January 1979, 45 Member States had established national or regional centres and another 18 were in the process of doing so.

(1) The Guide for the presentation in the primary literature of numerical data derived from experiments. - Paris: Unesco, 1974. - 7 p. - (SC.74/WS/19).
(2) Guidelines for editors of scientific and technical journals. - Paris: Unesco, 1979. - 36 p.
(3) Guidelines for ISDS (International Serials Data System). - Paris: Unesco, 1973. - 67 p. - (SC/WS/538).

80. The appearance of ISSN on the journals of many Member States testifies to the acceptance and the success of this UNISIST-sponsored effort. The assessment of the computer systems aspects by an independent group of experts revealed great satisfaction; while the ISDS file is serving not only identification purposes but also those of the creation of national or regional union catalogues, more remains to be done for a better, more efficient utilization of this and other ISDS products.

81. Second only to ISDS in seniority, the UNISIST International Information Centre for Terminology (Infoterm) was established in 1971 by contract with the Austrian Standards Institute and with substantial support from the Austrian Government. Associated with Technical Committee 37 (Terminology - Principles and Co-ordination) of ISO, Infoterm currently collects and disseminates highly-specialized information on terminological standards, publications, projects and courses. A committee of experts(1) in this field evaluated Infoterm in 1976 and found that its work was of high quality and its work-load increasing; the committee recommended continuing support and emphasized the importance and the need for more training in the field of terminology.

82. The Clearing-house for Thesauri and Classification Schemes has recently intensified its activities of providing information and advice in thesauri construction.

83. Initially, the classification and thesauri clearing-house functions were divided, with responsibility for the collection and dissemination of English language materials located in the United States, and for languages other than English in Poland. However, the functions of the United States centre have recently been taken over by a Canadian centre which is now responsible for information concerning North and South America and Australia and works in close liaison with the Polish centre, which will cover the remaining geographical areas. For a number of reasons, the technically-oriented clearing-houses have made a diminishing contribution to the UNISIST programme over the years. Their activities should be reviewed and revised so that they can respond more effectively to the emerging programme thrust of information for socio-economic development.

Inventories

84. A project initiated in 1971, with Unesco supporting FID and the (U.S.) National Science Foundation supporting the (U.S.) National Federation of Abstracting and Indexing Services (NFAIS) for compiling and recording in machine-readable form information on indexing and abstracting services of the world in all fields is yet to be completed. The data base has been compiled and tested. However, legal difficulties arose surrounding its publication and the project has been inactive for the past few years for reasons beyond Unesco's control.

85. The directory Information Services on Research in Progress - a World-wide Inventory(2) (1978), compiled by the (U.S.) Smithsonian Science Information Exchange (SSIE) in co-operation with UNISIST in response to recommendations of the UNISIST-sponsored International Symposium on Information Systems and Services in Ongoing Research in Science (1975),(3) represents a solid accomplishment. To

(1) Report on the Meeting for the Evaluation of the International Centre for Terminology (INFOTERM), Vienna, Austria, 1976. - 13 p. - (SC/UNISIST/ST.COM./Bur.5/3).

(2) Information services on research in progress: a world-wide inventory = Services d'information concernant les recherches en cours: répertoire mondial. - Budapest: Hungarian Central Technical Library and Documentation Centre, 1978. - XIX, 432 p.

(3) INTERNATIONAL SYMPOSIUM ON INFORMATION SYSTEMS AND SERVICES IN ONGOING RESEARCH IN SCIENCE, Paris, 1975. - Proceedings. - Budapest: Hungarian Central Technical Library and Documentation Centre, 1976. - 469 p.

provide a basis for continuing national efforts in this field, Guidelines on the Conduct of a National Inventory of Current Research and Development Projects[1] were issued.

Co-operative approaches to standards setting

86. Another activity in the normative field is the Broad System of Ordering (BSO).[2] Initially conceived by the International Federation for Documentation (FID) as a superstructure for a revised Universal Decimal Classification, the effort was dissociated from the UDC in 1972, and work was started, with UNISIST help, on compiling a list of broad terms to which individual classification systems could relate. For example, abstracting services in different fields of science, it was proposed, could use the BSO as a common scheme to exchange blocks of information.

87. A third revised version was published in September 1978 as a joint Unesco/FID publication after elaboration of the scheme incorporating the comments and results of practical testing on the two previous draft versions. Since its publication, UNISIST's efforts have been oriented towards encouraging its better utilization and application at various information centres and data banks.

Relationships with international non-governmental organizations

88. Of particular importance to the standardization activities is the close co-operation between UNISIST and ISO. During its developmental period, advisory groups had urged the UNISIST Secretariat not to try to duplicate the international standards setting function of ISO, but rather to support and accelerate processes conducted through existing channels. UNISIST has been successful in establishing a productive co-operative relationship with ISO and its Technical Committees over the years.

89. The Reference Manual for Machine-Readable Bibliographic Descriptions[3] represents an implementation of ISO 2709; ISDS has, as one of its main functions, the maintenance of the ISO Standard for ISSN (ISO 3297). The UNISIST Guidelines for Mono-[4] and Multilingual Thesauri[5] as well as its Indexing Principles[6] became, or at least served as a basis for ISO Standards in these fields.

90. As dissemination of standards is a prerequisite and sine qua non for their better utilization, UNISIST initiated and continues to support the International Information Centre on Standards in Information and Documentation and Related Fields (ISODOC) which ISO has established within the framework of the UNISIST programme.

91. UNISIST's role in supporting the publication of the ISO Standards Handbook: Information Transfer[7] has been mentioned; of more far-reaching potential was its effort to raise the level of co-operation in the international interchange of information on all kinds of standards through the International Information Network

(1) Guidelines on the conduct of a national inventory of current research and development projects. - Paris: Unesco, 1975. - 49 p. - (SC.75/WS/13).
(2) Broad system of ordering: schedule and index. - 3rd revision. - Paris: Unesco; The Hague: International Federation for Documentation, 1978. - 184 p.
(3) Reference manual ..., op. cit.
(4) Guidelines for the establishment and development of monolingual thesauri, op. cit.
(5) Guidelines for the establishment and development of multilingual thesauri, op. cit.
(6) Indexing principles, op. cit.
(7) Information transfer: handbook on international standards governing information transfer, op. cit.

for Standards (ISONET), considered as one of the most direct methods of technology transfer.

92. With these close relations, it will be possible to extend the field of co-operation with increased participation of experts from developing countries in ISO standardization activities. Schemes will have to be established to make certain that the particular standardization needs of developing countries are taken into account and to ensure that existing standards are modified so as to comply with local needs. It is felt that UNISIST could play an important role in this endeavour; a certain number of travel grants have already been provided for this purpose.

93. While ISO has been involved from the very beginning in UNISIST activities in this area which, at that time, were mainly concentrated on the requirements of the information community, notably ICSU-AB; the needs of the library world entered the programme at a later date through the participation of IFLA. With this organization, and in particular with its UBC Office, UNISIST has developed a close working relationship which included the organization of the International Congress on National Bibliographies. In addition to the work on the different ISBDs, mentioned earlier, essential normative elements for the preparation of a national bibliography were determined and agreed upon.

94. The International Federation for Documentation (FID) played a very useful role in the development of the Broad System of Ordering (BSO) and the World Register of Indexing and Abstracting Services described above.

The International Council on Archives (ICA), for its part, has so far not been closely associated with UNISIST's normative programme. This gap has been recognized and adequate provision made in the programme for 1979-1980.

95. Not only in the context of archival requirements did it become evident that, rather than to establish new standards or guidelines, it was essential to examine existing ones to see whether or not they were suitable for similar processes in fields other than that for which originally planned. This applies to various branches of the information community as well as to broad disciplines such as the social sciences. Detailed studies on the applicability of UNISIST guidelines to social science information activities have shown that several of the guidelines need to be modified so as to accommodate special needs.

96. To return to the problem of application and use of standards it is now clear that utilization depends largely on availability and training. Consequently, in parallel with the distribution of the texts of standards, and not only bibliographical references to them, a training programme on the application of standards, in which non-governmental organizations and other members of UNISIST Working Groups are actively involved has been set up.

97. An encouraging and successful start has been made by the organization of, three training seminars on bibliographic control. Two of these seminars took place in Africa and led to the establishment of a Permanent African Conference on Bibliographic Control; the third was held in Tunis for Arab Member States.

Development of information infrastructure and specialized international information resources and services

Introduction

98. For the purpose of this review "information infrastructure" connotes that complex of institutions, organizations, resources and systems and services which support the flow and delivery of information from the generator to the user, including its acquisition, processing, repackaging and transfer.

99. Certain countries have had both time and resources over the years to develop these mechanisms; however many countries, lacking them, are at a disadvantage. In view of Unesco's development priorities it is not surprising that the advisory and governing bodies of the UNISIST programme have consistently attributed a high priority to the development of information infrastructures.

100. In the early years of the UNISIST programme activities under this theme promoted the design and development of scientific and technological information systems and services. With the establishment of the General Information Programme the range of activities was broadened to encompass co-ordinated national information systems covering not only science and technology, but other sectors as well, libraries and archives. The principal orientation has been towards improving access to information in the developing countries.

101. In the implementation of the programme, the necessity is felt for using elements on information policy formulation, norms and standards and manpower questions developed by the UNISIST programme as well as other relevant internationally accepted guidelines, standards and procedures. The resulting compatibility will encourage the establishment of the world network of collaborating information systems and services foreseen at the conception of the UNISIST programme.

102. The programme includes many activities which while in fact components of national and regional information systems, sometimes provide the impression of being isolated activities with little or no relevance to the major objectives of UNISIST. The UNISIST feasibility study had recognized, however, that before many developing countries could reasonably hope to derive maximum benefit from UNISIST, there was need for the establishment of basic services including a national scientific and technological information agency and a strong scientific library system as a necessary substructure for the more advanced information handling programmes envisaged in UNISIST.

In review, actions undertaken could be placed in the following categories:

Promotion of the establishment of co-ordinated national information systems

103. This is done by setting up, in collaboration with Member States, national projects leading to the establishment of co-ordinated systems of information or important components of these information systems such as various types of libraries, archives or scientific and technical information services. Due to limited funds, only a nominal number of pilot projects can be financed. However, financing from the Regular Programme also provides for advisory services to Member States which wish to embark on this activity using national or extra-budgetary resources.

104. In this context, during 1977 and 1978 the development of library services to the rural community to support literacy and rural development programmes was initiated in Benin[1] and a second project for strengthening public library services in a socio-economic and cultural context was established in the Seychelles.[2] School library development was assisted in Uganda[3] and Lesotho.[4] A major project

(1) WILLEMIN (Sévère). - Développement des services de bibliothèques en milieu rural: République populaire du Bénin. - Paris: Unesco, 1978. - 34 p. - (FMR/BEP/PGI/78/134). - Restricted.

(2) HARRISON (K.C.). - Libraries, documentation and archives services: Seychelles. - Paris: Unesco, 1978. - 56 p. - (FMR/BEP/PGI/78/110). - Restricted.

(3) HAIDAR (A.). - Development of school libraries: Uganda. - Paris: Unesco, 1978. - 91 p. - (FMR/BEP/PGI/78/172). - Restricted.

(4) MCGRATH (L.). - Development of school library services: Lesotho. - Paris: Unesco, 1978. - 89 p. - (FMR/BEP/PGI/78/158). - Restricted.

encouraging more efficient records management to be launched in 1979 will establish procedures for a more effective utilization of scientific and technological information from the archives in the national information systems.

105. Many additional projects designed to strengthen components of the national information infrastructures are funded from Unesco's Participation Programme, from the United Nations Development Programme (UNDP) or through fund-in-trust arrangements and executed by the Division of the General Information Programme.

106. The forms of assistance most commonly employed for these projects are provision of experts or consultant services, equipment for demonstration purposes, training, most often in the form of fellowships for appropriate study in the region or elsewhere and contributions to the organization of seminars and meetings.

107. It has been observed that short-term advisory missions, frequently requested by Member States, have advantages and disadvantages. They permit Member States to act on what they perceive to be their priority needs; and they result in exposure to and participation in the objectives of the UNISIST programme. On the other hand, time does not always permit the consultant to surmount cultural and linguistic barriers, or achieve a full understanding of indigenous needs, as a consequence of which the results achieved may be superficial.

108. It is difficult to assess the results of these missions because there is limited opportunity for third-party evaluation. Unesco often has inadequate information on how the actions and measures recommended have been implemented.

109. The Programme has, however, made a start toward the evaluation of its field activities. A first step (1976) was the issuance of Criteria for Evaluating Proposals for UNISIST projects(1). The largest of its UNDP-funded projects involving automated processing of scientific and technical information in Bulgaria benefited from formal review and evaluation(2) (1975). An evaluation of Selective Dissemination of Information (SDI) projects in Latin America and Asia was undertaken, and guidelines have been established for evaluating other SDI projects.(3) UNISIST sponsored and published in 1977 the independent appraisal of AGRIS,(4) with funds-in-trust from the Food and Agriculture Organization (FAO).

Scientific and technological information services

110. A number of national scientific and technological information centres have been set up by Unesco over a period of two decades in Member States primarily for the purpose of serving the needs of the scientific research communities in those countries. With the emergence of the UNISIST programme, some of these centres have added responsibilities and better oriented their services towards also meeting information needs for social and economic development. However a preliminary examination has indicated need for the study planned for 1980 of the services offered and methodologies used together with recommendations for changes which could assist these centres to play a more effective part in the development activities of the Member States concerned.

(1) Criteria for evaluating proposals for UNISIST projects. - Paris: Unesco, 1976. - 2 p. - (SC.76/WS/96).

(2) AUTOMATED CENTRE FOR SCIENTIFIC AND TECHNICAL INFORMATION, Bulgaria. - Project findings and recommendations. - Sofia: UNDP/Unesco, 1978. - 35 p. - (UNDP/BUL/71/507)

(3) Guidelines for the establishment and evaluation of SDI and computerized documentation services. - Paris: Unesco, 1979. - (PGI.78/WS/22). - Preliminary version.

(4) Report on the independent appraisal of AGRIS. - Paris: Unesco, 1977. - 117 p. - (SC.77/WS/20).

Introduction of new technologies

111. Pilot projects help to examine the suitability of new technological developments, the modifications necessary and the conditions for their effective utilization by Member States. In this context several pilot projects have been undertaken by UNISIST where new technologies and techniques are introduced and tested over a period of time and thus subjected to evaluation before being recommended for application in all countries. With the help of the Canada Institute for Scientific and Technical Information (CISTI), Selective Dissemination of Information systems (SDI) were set up in Argentina, Mexico and India and services were provided to scientists in the host countries as well as in neighbouring countries over a period of years. Using a methodology for evaluation worked out by UNISIST,(1) the systems were then evaluated individually and the results were discussed at a meeting held in Canada in 1978. Each of the countries is now providing national SDI service without further subvention and the programmes have been made available to other interested countries.

112. With the assistance of the European Space Agency Information Centre, UNISIST supported a successful demonstration of on-line access to remote data bases.(2) Twelve hundred scientists in India participated in searching the ESRIN/RECON data bases located in Frascati, Italy.

113. A pilot project for recording and storing social and governmental information in machine readable form(3) has been established in Tunisia using a technique and methodology successfully developed by the Documentation Française in France. Other pilot activities aimed at standardizing methodologies and techniques thereby improving the possibilities of information transfer and exchange are being carried out in such fields as the production of union catalogues, establishment of national and regional bibliographies and the establishment of conservation, restoration and reprographic laboratories.

114. The large scale automation project,(4) undertaken with UNDP funds in Bulgaria is intended to serve both as a base for a regional information network with collaborating information centres in the Balkans, and to serve as a training centre for specialists from developing countries.

115. Through the UNISIST working group on the technology of systems' interconnection,(5) the infrastructure programme maintains a link with the telecommunication and informatics communities. The increasingly important role and the technological developments in the fields of mini and micro computers and satellite communications are being surveyed and monitored for their applicability to needs in developing countries.

116. A telex network among university libraries and a computer-based system were installed in Malaysia(6) to process bibliographic information received on MARC

(1) Guidelines for the establishment and evaluation of SDI and computerized documentation services, op. cit.

(2) A Brief report on recon on-line demonstration project linking to world sources of information at the Tata Institute of Fundamental Research, Bombay, 20-25 September, 1976. - New Delhi: Indian National Scientific Documentation Centre, 1976. - 7 p., annexes.

(3) VALLS (J.). - Projet pilote pour la mécanisation des services de documentation dans les pays arabes: Tunisie. - Paris: Unesco, 1976. - 23 p. - (FMR/CC/DBA/76/119).

(4) AUTOMATED CENTRE FOR SCIENTIFIC AND TECHNICAL INFORMATION, Bulgaria, op. cit.

(5) UNISIST WORKING GROUP ON TECHNOLOGY OF SYSTEMS' INTERCONNECTION, 1, Paris, 1976. - Final report. - Paris: Unesco, 1977. - 23 p. - (UNISIST/I/TSI/76/I.6 Rev.).

(6) TELL (Björn). - Pilot project on the development of a library network: Malaysia. - Paris: Unesco, 1976. - 30 p. - (FMR/CC/DBA/76/153).

tapes and supplemented by the national input. Information retrieval and SDI services will be built on the data bases thus created.

Technical co-operation among developing countries (TC/DC)

117. A programme area where UNISIST has been relatively successful is in fostering co-operative activity among developing countries. Early efforts to support international networking activities were undertaken in Latin America and in South East Asia (1972) where the countries involved are continuing co-operation at the policy level and in the organization of education and training programmes. The preparatory meeting of information experts held before the CASTARAB Conference (1976) identified areas for collaboration among Arab States which were formally adopted by the Conference itself later that year.(1) The SDI services mentioned in the last section have each served users in neighbouring countries and have thus become a means for regional co-operation.

118. The 1974 CASTAFRICA Conference resulted in a feasibility study,(2) undertaken by WFEO with UNISIST aid, of a central African data bank with appropriate sub-regional branches for information on imported and local technologies. Following the recommendations of the study, a pilot technological SDI project is being implemented in Nigeria with a view to possible later extension of services in the region and inclusion of information on local technologies.

119. As the present capability of information networks does not permit the transfer of textual information in most cases, the UNISIST programme is associated with a current project promoted by the International Federation of Library Associations and Institutions towards the Universal Availability of Publications (UAP). This project is expected to ameliorate the difficulty experienced by scientific workers and other information users in developing countries in obtaining the textual material required. One of the possible solutions is the establishment of regional information centres and the UNISIST programme is associated with a number of collaborative efforts which might create such centres in different regions of the world.

Specialized international resources

120. Reviewed under this section are the programme's relations with the specialized resources represented by institutions processing numerical scientific data, and by information analysis centres.

Numerical data

Recommendation 10 of the UNISIST Feasibility Study, emphasizing the importance of numerical data as well as bibliographic materials to science and technology, proposed collaboration between ICSU's Committee on Data (CODATA) and UNISIST in the development of networking among numerical data centres in the sciences and in relating their functions to bibliographic activity.

121. A 1972 contract with CODATA resulted in a Study on the Problems of Accessibility and Dissemination of Data for Science and Technology,(3) whose recommendations

(1) National and regional planning for scientific and technological information systems and services for development in the Arab countries. - Paris: Unesco, 1976. - 6 p. - (SC.76/CASTARAB/REF.4).

(2) Feasibility study: data bank services in Africa. - Paris: Unesco, 1975. - 21 p. - (SC/UNISIST/Adv.Com.II/INF.3).

(3) Study on the problems of accessibility and dissemination of data for science and technology. - Paris: Unesco, 1974. - 102 p. - (SC.74/WS/16).

led to a series of productive co-operative activities. Among these are: establishment of a World Data Referral Centre (1977);[1] a Guide for the presentation in the Primary Literature of Numerical Data;[2] a Symposium on Man-Machine Communication in Scientific Data Handling;[3] a joint study with CODATA and ICSU/AB on the relationship between secondary information services and data services (1975);[4] the drafting of an exchange format for numerical data; and the holding of short-term training courses for scientists in the handling of numerical data.

Information analysis centres

122. UNISIST's efforts to move significantly toward the realization and establishment of Information Analysis Centres (IACs) have undergone significant modifications. The programme commissioned CODATA to study the role of information analysis centres in a world science information network (1973),[5] and assembled a Working Group on Information Analysis Centres to review this and a background paper on the role of critical evaluation and analysis in the production of new knowledge.[6] Within the context of the UNISIST programme it would appear that the original concept of an Information Analysis Centre intended for validation and consolidation of experimental data in the physical sciences has been expanded to encompass an IAC for the selection and diffusion of scientific and technical data and information for social and economic development.

Promotion of the application of scientific and technical information in development

123. In 1975 a project was initiated for a detailed study on the transfer of scientific and technical information to predominantly rural populations in developing countries in order to measure its impact on development. Field surveys were made in Costa Rica, India, Malaysia, Sri Lanka and Tanzania. The reports of the surveys were discussed at a meeting of experts convened in Bangalore, India, in 1978 in collaboration with the ICSU Committee on Science and Technology for Development (COSTED).

124. This meeting was followed up by a UNISIST symposium on information analysis and consolidation[7] organized in collaboration with the National Science Council of Sri Lanka. The discussions centred around the evaluation and consolidation functions of information analysis centres, particularly those supporting economic and social development and serving such sectors as agriculture, health, industry and education. It recommended that UNISIST support a series of studies together with the preparation of guidelines and pilot projects to test them.

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(1) Feasibility study of a world data referral centre. - Paris: ICSU/CODATA, 1975. - 39 p. - (CODATA Special report; 2.).

(2) Guide for the presentation in the primary literature of numerical data derived from experiments. - Paris: Unesco, 1974. - 7 p. - (SC.74/WS/19).

(3) SYMPOSIUM ON MAN-MACHINE COMMUNICATION FOR SCIENTIFIC DATA HANDLING, Freiburg im Bresgau, Federal Republic of Germany, 1973. - Report. - s.l., CODATA Task Group on Computer Use, (1973). - 14 p.

(4) ICSU/AB/CODATA JOINT WORKING GROUP ON TAGGING AND FLAGGING. - "Flagging and tagging data to indicate its presence and facilitate its retrieval" in, Information Reports and Bibliographies, Vol. 6, No. 4, 1977, pp. 7-26.

(5) Study report on the role of information analysis centres in a world science information network. Paris: Unesco, 1975. - 89 p. - (UNISIST/I/IAC/75/1.4).

(6) WORKING GROUP ON INFORMATION ANALYSIS CENTRES, Paris, 1975. - Background paper. - Paris: Unesco, 1975. - 18 p. - (UNISIST/I/IAC/75/1.3).

(7) SYMPOSIUM ON INFORMATION ANALYSIS AND CONSOLIDATION, Colombo, Sri Lanka, 1978. - Final report. - (In preparation).

Contribution to the development of specialized information systems in the fields of education, culture and communication and the natural and social sciences

125. As mentioned earlier in the paper, in order to accommodate sectoral information activities making a contribution to the Transfer and Exchange of Information objective, a new theme (subobjective) with the title "Contribution to the Development of Specialized Information Systems in the Fields of Education, Culture and Communication, and the Natural and Social Sciences" has been established within the biennial programme and budget.

126. In the Approved Programme and Budget for 1979-1980 a number of PGI activities have been placed under this theme. The International Information System on Research in Documentation (ISORID) earlier developed in DBA, will be continued in close collaboration with FID, IFLA, and ICA. An informational leaflet and an "International Directory of Institutions active in the field of Research in Information, Libraries and Archives"(1) as well as an "International Directory of Specialists involved in Research in Information, Libraries and Archives"(2) are to be issued. Another project envisaged is improving the services of the World Data Referral Centre (WDR) in Paris with a view to establishing an international referral network. In collaboration with CODATA, a number of directories will be prepared.

127. In other Unesco Sectors several international systems have been undertaken. The Science Sector has under development a Science and Technology Policies Information Exchange System (SPINES); the Social Sciences Sector operates a data retrieval system covering research reports and other important documents, institutes and specialists in the area of Social and Human Sciences (DARE); and in the Education Sector the International Bureau of Education in Geneva has established a Documentation and Library System, and an International Educational Reporting Service (IERS). In accordance with the principles of reorganization of Unesco's information programmes adopted by the nineteenth session of the General Conference (19 C/42),(3) these systems constitute forms of action for the furtherance of specific educational, scientific or cultural programmes. While Unesco's sectoral systems subscribed to UNISIST principles, budgeting and management rest with the sectoral authority; the UNISIST role has been consultative and advisory. Co-ordination is facilitated through the Intersectoral Committee for Co-ordination of Activities in the Field of Information established within the framework of the Committee for Intersectoral Co-operation.

Programmes designed to promote the training and education of professionals and users of information

Introduction

128. The education and training element of the UNISIST programme can be traced to recommendation 13 of the Feasibility Study which stressed the need for specialized training to operate and use the new modalities of information transfer. Emphasis on education and training activities had also characterized the DBA

(1) ISORID. - Répertoire international des institutions actives dans le domaine de la recherche sur l'information, les bibliothèques et les archives. - (En préparation).

(2) ISORID. - Répertoire international des spécialistes actifs dans le domaine de la recherche sur l'information, les bibliothèques et les archives. - (En préparation).

(3) UNESCO. GENERAL CONFERENCE, nineteenth session, Nairobi, 1976. - Report of the Director-General on the overall information programme, op. cit.

programme. Once the needs of the developing countries for manpower to plan, organize and provide information services for development were articulated, education and training programmes achieved a new focus in the UNISIST programme. All advisory groups and the governing bodies of UNISIST and of the General Information Programme have consistently assigned high priority to this area.

129. The programmes here reviewed have been marked by certain characteristics. Among these are: attention paid to the development of educational policies and strategies, to continuity of effort and to project evaluation. In organizing activities, particular stress has been given to using Unesco's funds as "seed money" for activities deemed to have a "multiplier effect". These characteristics have given the programme a homogeneity and strength, despite the great variety of educational needs.

130. The First Meeting of the Steering Committee(1) recommended the establishment of an Ad Hoc Committee on Education and Training Policy and Programme; the Committee has held sessions in 1975, 1976 and 1978. The Ad Hoc Committee, composed of highly qualified experts, has performed a valuable advisory function for UNISIST, evaluating specific projects, advising on programme priorities, discussing and recommending solutions to problems. It has accomplished two independent assessments of the UNISIST programme's education and training projects, one in 1975(2) and one in 1978.(3) The reports of the Ad Hoc Committee have been influential in assisting the advisory and governing bodies of UNISIST and the General Information Programme to determine the shape of the programme in this area.

Harmonization and co-ordination of programmes

131. Prior to the activation of the UNISIST programme, a Working Group on the Information Requirements of Developing Countries,(4) calling attention to the multiplicity of public and private agencies offering support for training activities in developing countries, proposed that UNISIST promote the co-ordination of such efforts. A plan was prepared for the review and endorsement of the Steering Committee at its first session.(5) The question was then referred to the Ad Hoc Committee on Training and Education Policy and Programme which gave it its support, but it was not until 1977 that plans were laid to hold a meeting of Sponsors of International Assistance Programmes in Education and Training of Specialized Information Personnel.(6)

132. The meeting, held in 1978, included representatives of 5 agencies of the United Nations, 3 regional intergovernmental organizations, 3 non-governmental organizations and 5 national technical assistance programmes. The meeting stressed the need to strengthen the collection of information from the countries, to issue a periodic

(1) UNISIST STEERING COMMITTEE, 1, Paris, 1973. - Final report. - Paris: Unesco, 1974. - 35 p. - (SC/MD/38).
(2) SAUNDERS (W.L.). - Study of on-going and planned activities in training and education. - Paris: Unesco, 1974. - 45 p. - (SC/UNISIST/Com.E.T.1/3).
(3) VICKERY (B.C.). - Past, on-going and planned activities in training and education. - Paris: Unesco, 1978. - 52 p. - (PGI/E.T./III/3).
(4) AD HOC WORKING GROUP ON INFORMATION REQUIREMENTS OF DEVELOPING COUNTRIES IN THE FRAMEWORK OF THE UNISIST PROGRAMME, Paris, 1972. - Final report. - Paris: Unesco, 1972. - 12 p. - (UNISIST/V/DC/72/1.5).
(5) Harmonization of international assistance programmes in training and education. - Paris: Unesco, 1973. - 6 p. - (SC/UNISIST/St.Com.I/10).
(6) MEETING OF SPONSORS OF INTERNATIONAL ASSISTANCE PROGRAMMES IN EDUCATION AND TRAINING OF SPECIALIZED INFORMATION PERSONNEL, Paris, 1978. - Summary report. - Paris: Unesco, 1978. - 10 p. - (PGI/SPONS/E.T./K.5).

register of on-going programmes which would be kept updated by a Newsletter and to extend the number of inter-agency co-operative ventures. UNISIST's continuing role in efforts to harmonize training programmes was generally approved.

133. The already substantial progress in this area is evidenced by the participation as contractor or co-sponsor with Unesco of a large number of agencies and organizations as well as a sizeable number of Member States in the implementation of a wide range of education and training activities.

134. Experimental issues of a Newsletter on Education and Training Programmes for Specialized Information Personnel were issued during 1977-1978 under a contract with the International Federation for Documentation (FID) and the continuation of this endeavour is foreseen during 1979-1980. During 1979 an expert meeting will be convened to make recommendations on the harmonization of existing archival training programmes and to consider their relationship to education and training programmes in librarianship and information science. It is expected that a start of data-collection activities in the education and training area, long requested by advisory and governing bodies, will be made during the 1979-1980 biennium and co-operative action among agencies and organizations will be intensified.

Establishment and development of national and regional education and training programmes

135. The long term goal for efforts in education and training is to build up in each country or homogeneous region the facilities needed for education and training of the full range of information specialists and technicians required to man modern information systems and services. Means employed have included sending consultants to help with the initial planning or expansion of programmes and teachers in special fields like automated data processing, information retrieval or reprography, restoration and preservation.

136. Funds from the United Nations Development Programme (Country and Inter-country Programmes) have been made available for establishing and improving national or regional schools. A nine-month post-graduate training course for science information specialists with support from the Inter-country Programme of the UNDP, Unesco's Regular Programme and a number of other agencies and organizations was inaugurated in August 1978 at the University of the Philippines as a collaborative project of the Governments of Indonesia, Malaysia, the Philippines, Singapore and Thailand. Other UNDP-funded projects include the School of Information Sciences in Morocco and the regional archival training programme at the University of Ghana. Sizeable UNDP contributions have been made in the past to setting up regional professional schools in Senegal, Jamaica and Uganda. Some modest Regular Programme assistance has been used to reinforce such schools when UNDP assistance has come to an end by providing short-term teachers in special subject areas, needed equipment and fellowships for training permanent teachers.

137. Two "Guidelines" publications, one on curriculum development in information studies[1] and a second on formulating policy on education, training and development of library and information personnel,[2] prepared at the suggestion of the Ad Hoc Committee have recently appeared. A third on methodology for information manpower forecasting is under preparation. These are expected to make an appreciable contribution to development of appropriate education and training facilities.

(1) Guidelines for curriculum development in information studies. - Paris: Unesco, 1978. - 38 p. - (PGI.78/WS/27).

(2) Guidelines for formulating policy on education, training and development of library and information personnel. - Paris: Unesco, 1978. - 38 p. - (PGI.78/WS/29).

Teaching materials for information specialists

138. One of the first actions of the programme was to commission a reference Handbook for Information Systems and Services.(1) This was published in 1977 as a basic text to be used in developing countries. Two guides for teachers were also commissioned: Guidelines for the Organization of Training Courses, Workshops and Seminars in Scientific and Technical Information and Documentation;(2) and Education and Training of Users(3) of Scientific and Technical Information: UNISIST Guide for Teachers. As a follow-up to a co-operative training effort with the Food and Agriculture Organization and the International Atomic Energy Agency, UNISIST prepared under contract a basic manual on information for untrained staff in developing countries, which will be published in 1979.(4)

139. At its 1978 meeting, the Ad Hoc Committee considered the needs of schools in developing countries for textbooks and other teaching materials. It was agreed that there is a serious shortage of appropriate study materials of all types and that a key task is the identification of priority needs. Emphasis was placed on the importance of producing materials in appropriate languages which reflect the distinctive socio-economic needs of the countries and regions concerned. A number of agencies and organizations have expressed willingness to work with Unesco in producing materials for which priority need can be demonstrated.

Teaching staff for schools and training programmes

140. Because of the high "multiplier effect" which activities in this area have been judged to have, a very high priority has been assigned since the early days of the programme to activities involving teacher training. The Ad Hoc Committee at its 1978 meeting felt that training new teachers and updating the skills of established teachers continues to be of the highest importance. One of the most successful activities in this area has been the recurring summer courses for teachers in the information field conducted by the University of Sheffield. Assistance has also been given to enable future teachers of information science, librarianship or archival studies from developing countries to participate in formal academic courses in education methods and modern information techniques.

141. During 1979-1980 additional training courses for teachers will be organized and short-term consultant services will be available to aid appropriate institutions in Member States in conducting intensive refresher seminars on modern teaching methods and materials.

Courses, seminars and workshops

142. As noted earlier, the UNISIST training projects have been marked by continuity of effort. There are distinct advantages in a strategy of iterative activities over one-time projects, not the least of which is the ability to learn by experience and feedback. As part of a series designed for managers of information systems,

(1) ATHERTON (Pauline). - Handbook for information systems and services. - Paris: Unesco, 1977. - 259 p.
(2) Guidelines for the organization of training courses, workshops and seminars on scientific and technical information and documentation. - Paris: Unesco, 1975. - 88 p. - (SC.75/WS/29).
(3) Education and training of users of scientific and technical information: UNISIST guide for teachers. - Paris: Unesco, 1977. - 143 p.
(4) MENOU (Michel J.); GUINCHAT (C.). - Introduction générale aux sciences et techniques de l'information et de la documentation. - (En préparation).

courses(1) were held from 1975 through 1977 in Mexico, the Philippines and Turkey. A variant for directors of university libraries in French-speaking African countries was offered in Senegal in 1978. With the support of the French National Commission for Unesco and BNIST, a post-graduate course for the training of information specialists has been given in France annually since 1974. Unesco has assisted the United Nations Industrial Development Organization (UNIDO) in the organization of an annual training course for industrial information officers held at VINITI (USSR). The long-range training programmes for generators and users of numerical data developed by CODATA have already been mentioned. These efforts conform to several of the principles proposed for a UNISIST educational strategy by the Ad Hoc Committee: They are for the most part aimed at an audience of teachers or managers; they incorporate workshop experience, and they often represent a first step towards the long range goal of helping the developing countries to build up their own training capabilities.

143. Two of the earliest of the UNISIST training projects were a three-week course in information retrieval and retrieval systems conducted in Poland in 1974, and a training course on information networking and systems interconnection in South East Asia, held in Japan in the same year. In each case, the government shared the costs. UNISIST and the Oficina de Educación Ibero-americana (OEI) joined forces to organize a Spanish Language International Summer School in Spain in 1975. Subsequent representative activities included an International Seminar on Indexing (Poland, 1976), a Regional Seminar on Indexing Languages (Argentina, 1978), both in co-operation with the United States National Federation of Abstracting and Indexing Services (NFAIS), and an International Seminar in Information Science (Morocco, 1978).

144. The Ad Hoc Committee, in its consideration of educational strategy, pointed out that short-term courses should be designed to meet clearly established needs, that they should deal with new subjects, that practical training and workshops were to be preferred, and that brevity was a necessity in planning seminars designed to create an awareness among government officials of information problems. Short-term courses can be expensive, with one course a year consuming as much as 10 per cent of the UNISIST budget in this area for a year. The generous contribution of national governments and various assistance agencies to these activities has to a considerable extent decreased the fiscal burden on the UNISIST programme.

145. A large number of fellowships (more than 50 during the biennium 1977-1978) have been provided in each budgetary period under Unesco's Participation Programme for preparing information specialists at various levels, most frequently through enrolment in formal academic programmes.

Promotion of users education

146. It has been pointed out that the most sophisticated information systems and services are of no value unless users have the motive and the skills to use them. UNISIST efforts to stimulate programmes for user education stemming from this principle constitute one of its more innovative programmes.

147. The Unesco Medium-Term Plan (1977-1982)(2) includes in its statement concerning the desired overall impact in the education and training area a wish to "promote education of user groups for a more effective utilization of information resources". Up to the present, the approach to the problem has been indirect and it is unlikely

(1) A course in administration for managers of information services: design, implementation and topical outline. - Paris: Unesco, 1976. - 79 p. - (SC.76/WS/110).

(2) Medium-Term Plan (1977-1982), op. cit., p. 326.

that the limited resources available will make it seem desirable in the future for UNISIST to itself organize directly activities for users.

148. As early as 1973, a manual for the training of users was commissioned; this appeared in 1977 under the title: Education and Training of Users of Scientific and Technical Information: UNISIST Guide for Teachers.(1) Its impending publication was preceded by two well-prepared seminars in October 1976, the first held in Thailand(2) and the second in Italy.(3) The Thailand Seminar recommended that user education and training be given strong future emphasis in the UNISIST programme, and that special attention be paid to the education on the one hand of administrators, planners and policy-makers and on the other to extension workers in agriculture and industry.

149. The Rome Seminar made recommendations, ranging from the formulation of national policy on user education to the conduct of user need surveys and the preparation of user training guides. In common with the first seminar, it laid stress on the sensitization of administrators and planners, and users in the industrial sector.

150. The recommendations of these seminars have heavily influenced subsequent programme actions. Guidelines for developing a national plan for training in information use are in preparation and will be tested during the 1979-1980 biennium in a small pilot project in which emphasis will be placed on introducing training activities for scientists and technologists as well as other target groups including rural extension workers and students. Support will be given to developing specialized training programmes and methodologies for the education of various groups of users.

Evaluation

151. Since educators have developed evaluation methodology as much as or more than any other profession, the early requests of the Steering Committee that the results of UNISIST projects be evaluated fell on fertile ground. The 1974 course on information retrieval and retrieval systems (Poland) was accompanied by formal evaluations. This led to the preparation of Guidelines for the Evaluation of Training Courses, Workshops and Seminars in Scientific and Technical Information and Documentation,(4) which has proved useful in the subsequent evaluation of other short-term projects.

152. In 1976, the Ad Hoc Committee using these Guidelines reviewed a comparative evaluation(5) of six of the UNISIST courses held to date, and identified a number of principles to be observed in planning and conducting future training efforts.

153. In 1978, the Ad Hoc Committee again turned to the question and noted with satisfaction that a large number of PGI's activities in this area have been evaluated at their conclusion. It was pointed out that it would be desirable to evaluate not only the immediate results but the impact of activities a year or more after their

(1) Education and training of users..., op. cit.

(2) UNISIST SEMINAR ON THE EDUCATION AND TRAINING OF USERS OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION, Bangkok, Thailand, 1976. - Final report. - 50 p. - (SC.77/WS/8).

(3) UNISIST SEMINAR ON THE EDUCATION AND TRAINING OF USERS OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION, Rome, Italy, 1976. - Final report. - Paris: Unesco, 1977. - 99 p. - (SC.77/WS/22).

(4) Guidelines for the evaluation of training courses, workshops and seminars in scientific and technical information and documentation. - Paris: Unesco, 1975. - 101 p. - (SC.75/WS/44).

(5) SAUNDERS (W.L.). - A comparative analysis of UNISIST short courses. - Paris: Unesco, 1976. - 26 p. - (SC/UNISIST/Com.E.T.II/3).

completion. They recommended that evaluation criteria be established for use in assessing project proposals and the impact of projects. The attention paid to evaluation in the field of education and training represents a significant contribution of the UNISIST programme.

III. THE UNISIST PROGRAMME AND THE UNITED NATIONS SYSTEM

154. At the end of the First Development Decade (1960-1970), Sir. R.G.A. Jackson prepared an extensive survey of the development capacity of the United Nations system. The Jackson report(1) identified the lack of information systems for the management of development projects as a major deficiency. Led by the success of the International Atomic Energy Agency (IAEA) in the establishment and operation of an Intergovernmental Information retrieval System (INIS) in 1970, a number of United Nations agencies have initiated or studied the possibility of developing specialized information systems.

155. Many of these have been based on the "territorial formula" pioneered by INIS and AGRIS, in which each Member State contributes its national information product within an agreed scope, and receives in turn the merged products of other participants.

156. The UNISIST programme itself has not established a territorial formula system, but has been supportive of the efforts of other United Nations agencies to do so. Conceptually, these conform to the UNISIST principles of increased international co-operation and standardization, and the UNISIST Secretariat has consistently provided advice and publicity to such efforts as the Population Information System (POPINS) under development by the United Nations Department of Economic and Social Affairs. Similarly, the Secretariat has supported the wider use of ILO's Integrated Set of Information Systems (ISIS), a homogeneous group of computer programmes for library and bibliographic purpose.

157. Under the authority of the United Nations Administrative Committee on Co-ordination (ACC), an Inter-Organization Board for Information Systems (IOB) was created to co-ordinate information systems in the United Nations family.

158. Over the past few years, the establishment of information systems and services by United Nations agencies has escalated, considerably adding to the problem of co-ordination and harmonization, and the IOB is now streamlining and strengthening its activities. It recently published a "Directory of United Nations Information Systems and Services"(2) which provides information on 84 operational and 22 developmental, publicly available information services; 54 per cent of these were begun after the UNISIST programme was launched in 1973. Some of the systems described serve Member States; others are internal to the agency sponsoring them. They vary widely in size as well as in purpose.

159. In the meantime, proposals by developing countries for information services related to the international transfer of technology for economic and social development culminated in resolution 3507 of the General Assembly's Thirtieth Session,(3) which, in addition to authorizing UNIDO to establish an industrial technology

(1) JACKSON (R.G.A.). - Study of the capacity of the United Nations development system. - Geneva: United Nations, 1969. - 2 v.

(2) Directory of United Nations information systems and services. - Geneva: Inter-Organization Board for Information Systems, 1978. - 267 p.

(3) UNITED NATIONS. General Assembly. - Resolutions adopted by the General Assembly during its Thirtieth Session, 16 September - 17 December 1975. - New York: United Nations, 1976. - 175 p. - (A/10034).

data bank as a component of an overall technological information exchange network, authorized the establishment of an Inter-Agency Task Force on Information Systems (IATFIS). IATFIS was charged with the task of undertaking an extensive analysis of the possibilities of establishing a United Nations information network supportive of technology transfer with a view to the preparation of a plan for its development.

160. In a parallel action, the Committee on Science and Technology for Development of the Economic and Social Council (ECOSOC) stressed the desirability of co-operation with the information systems already established by governments, and noted the utility of the UNISIST model in providing a useful conceptual framework for the network. IATFIS has prepared two reports(1)(2) on the network which were channelled through ECOSOC and presented to the United Nations General Assembly by the Secretary-General.

161. Unesco participated actively in IATFIS, and it is worth noting that the principles this inter-agency group agreed on for the establishment of a United Nations network are highly consonant with those of UNISIST.

162. It is in connection with these developments that the relation of UNISIST to the information systems and services of the other United Nations agencies must be reviewed. This relationship is especially critical today as all the United Nations agencies are orienting their information programmes toward economic and social development.

163. The UNISIST feasibility study report noted a need to co-ordinate the technical assistance efforts of the United Nations agencies in the field of scientific and technical information, and proposed that UNISIST might serve as a forum or clearing-house for the pooling of information about these programmes. The first UNISIST Intergovernmental Conference called upon other agencies of the United Nations to lend their full support and co-operation in the implementation of the Conference's recommendations. The General Conference at its seventeenth session expressed a wish that the UNISIST programme be carried out in collaboration with the other organizations of the United Nations, and the UNISIST Intergovernmental Steering Committee at its first session in 1973 recognized a need for the UNISIST programme to harmonize all relevant information and documentation activities of the United Nations family, and reiterated this position at its second meeting in 1975.

164. The Administrative Committee on Co-ordination is the United Nations inter-secretariat organ formally charged with harmonizing the sectoral programmes of the United Nations agencies; its Inter-Organization Board for Information Systems (IOB) intends to undertake a new level of effort in co-ordinating the development of compatible information systems in the United Nations family.

165. IOB and UNISIST have complementary goals, and a closer working relationship was established in 1978. It is envisioned that a joint programme now being developed will be implemented over the next few years.

166. It would appear basic to Unesco's policy that every effort be made to collaborate with IOB in harmonizing United Nations agency information programmes, and that it should offer the experience gained through the UNISIST programme as a contribution to further co-operative action among the United Nations agencies.

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(1) UNITED NATIONS. Economic and Social Council. - Establishment of a network for the exchange of technological information. - New York: United Nations, 1976. - 22 p. - (E/5839).

(2) UNITED NATIONS. Economic and Social Council. - Institutional arrangements in the field of the transfer of technology: establishment of a network for the exchange of technological information. - New York: United Nations, 1977. - 22 p. - (E/6002).

167. The IOB task will not be an easy one. Its published directory of information systems and services demonstrates the great variety of systems purposes, philosophies, sophistication, levels of development and user groups. Traditional inter-agency differences of opinion underlie this variety, and adjustments may prove difficult. Nevertheless, the accomplishment of an inventory of United Nations information systems, the publication of the Directory, and the strong support of the Administrative Committee on Co-ordination have laid a solid foundation for its future work.

168. There is abundant evidence that as the organizations in the United Nations family have developed larger and more sophisticated systems, they have opted for de facto co-operation of a high order. The International Nuclear Information System (INIS) has generously shared its expertise, resources, and experience with the AGRIS System of the Food and Agriculture Organization (FAO). The Integrated Set of Information Systems (ISIS) initially developed by the International Labour Organisation (ILO) and now maintained and updated by Unesco has been used by UNIDO, FAO, Unesco and other United Nations agencies as well as a growing number of Member States.

169. Many of the agencies with which IOB will be concerned, therefore, have a long record of ad hoc co-operation; the experts responsible for the development of their information systems are well aware of the desirability of sharing the costs of systems components, and of seeking compatibility with systems designed by their colleagues.

170. This brief review of the past experience points to some directions for the future co-operative efforts between UNISIST and IOB and their respective roles in the programmes for co-ordinating the information activities within the United Nations system. Some of these are considered in Part C.

PART B

THE FLOW AND UTILIZATION OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION AND ITS ROLE IN DEVELOPMENT

I. INTRODUCTION

1. One of the purposes of the UNISIST II Conference is to supply input to the United Nations Conference on Science and Technology for Development (UNCSTD), which will be held in Vienna on 20-29 August 1979. From the outset, scientific and technological information has been an item on the agenda of UNCSTD. The aim of this part is to provide a suitable background for discussion.

2. Part A of this document traced the development of UNISIST, which was initially confined to information of relevance to basic and applied scientific research and technological development processes, but which gradually came to occupy the much wider field of information for development. This trend reflects the growth of awareness in the international community of the importance of science and its applications for the development of countries which, owing to their past history and to the present world economic system, possess only limited scientific and technological potential compared with that of the more developed nations.

3. The results already achieved, or that are to be expected from science and technology at the world level, should be turned to account by the countries in the context of their own strategies for economic and social development, and in harmony with their political options. The practical utilization of knowledge, research findings or technologies is meaningful and relevant to development only if it takes a great many factors of different kinds into account, the foremost of these being social and economic factors; Scientific and Technological Information (STI) has, therefore, to be integrated with an extremely complex body of information.

4. However, the decisive role of technological advances in development and the wide range of possibilities and choices that it opens up make it understandable that scientific and technological information should occupy a central position in a system of information for development all of whose components are going to interact. In this connection, we should recall the definition of scientific and technological information adopted in this document:

> "Information" is the content or message of a written or oral communication or discourse.
>
> "Scientific information" is information arising from or pertaining to research activities, usually in the natural and social sciences. The research may be basic or applied; it may be exploratory, observational or experimental.
>
> "Technology" is scientific, engineering, managerial and other knowledge necessary to produce the goods and services needed by society.
>
> "Technological information" is information pertaining to technology.
>
> Scientific information and technological information are thus interdependent, and often carried by the same or similar media - books, periodicals, reports, etc. Also, they are used together in development-catalysing activities. Hence, the phrase "Scientific and Technological Information" (STI).

> Development also requires economic, social and cultural information - for example population and commercial statistics - which is neither scientific nor technological but is generated for operational purposes. Such forms of information are also included in the usage of the document, especially when the term "information" is used instead of "scientific and technological information".

This definition is a very broad one, covering the documentary materials and tools needed for scientific procedure in all the sciences - not only in the natural sciences - and the data of all kinds which that procedure brings into use.

5. The widening of UNISIST's range of objectives calls for an overall definition of the information flows, of various kinds, on whose circulation the optimum use of science in its applications to development depends: these flows are established within national communities, between national groups and between countries, through regional and international relations. Analysis of the necessary flows will make it possible to distinguish the various categories of users, whose needs should guide the future activities of UNISIST, continuity being maintained with the activities already under way.

6. We shall consider first of all (see below, II) the circulation of scientific and technological information in the system formed by scientific and technological activities themselves: these flows are indicative of the role of STI in building up science and technology and in disseminating knowledge and findings to users who are themselves scientists, engineers and technologists. At the level of national government, the organization of these flows is determined chiefly by science and technology policy. But since that policy has its place in the wider framework of development policy, they also serve development, through the attainment of scientific and technological objectives determined in accordance with the economic and social priorities of society. We shall find that, in this first system, the primary sources of STI are widely exploited.

7. We shall then (III) consider, at a higher level of integration, the flows of information circulating in the highly complex and highly diversified system of development activities. Only some of these have scientific or technological content. These flows affect all decisions, at every level, concerning development programmes and operations, even at the lowest level, such as that of local communities or small firms. The problem is how to combine different kinds of information flow so that the messages may be utilized by users with varied occupational profiles, whose needs are, in any case, very different from those of scientists and technologists. In particular, most of these users do not have the necessary qualifications to contribute to the advancement of science and technology, but merely make use of their output. In the field of STI, they need sophisticated material that is readily usable, in order to make practical choices, and as a rule they are not expected to have recourse to the primary sources of STI.

8. But, from a wider angle, the participation of populations in development calls for the dissemination of science and technology throughout society, and the integration of scientific and technological culture with the cultures specific to that society. Special consideration should be given to the role of STI in this connection (III (b)).

9. Finally, we shall contemplate the consequences for the circulation of STI of the considerable development of modern communication and information technologies resulting from advances in informatics. This development has facilitated the establishment of universal systems which are already in use. It has paved the way

for the more effective circulation of information at the world level between countries with high scientific potential and countries whose scientific potential is still limited, with a view to development based on community of purpose in line with the objectives sought through the establishment of a New International Economic Order.

10. Indeed, it is important to consider the issue from the global point of view of the establishment of more equitable relations between the wealthier countries, which have both material facilities and scientific power, and the developing countries, whose resources are limited. Flows of STI at present are uneven, just as currency and trade transactions are uneven, and they originate from the wealthy countries. But although this state of affairs is undeniable, for the developed countries are still the leading producers of applicable scientific and technological results, the right to information and to unrestricted access to the capital of knowledge and experience accumulated throughout the world should be asserted. The analyses and lines of emphasis put forward in this document start from this fundamental precept, which has been adopted by the international community.

II. SCIENTIFIC AND TECHNOLOGICAL INFORMATION, THE POLICY OF SCIENCE FOR DEVELOPMENT AND ENDOGENOUS SCIENTIFIC DEVELOPMENT

The circulation of STI, an intrinsic factor in the advancement of knowledge and technologies

11. Originally STI in modern societies was exclusively bound up with scientific and technological activities; its historical development kept pace with those activities. In this initial context, the facilities necessary for STI, the solution of the practical problems posed by the collection, dissemination and utilization of documentary material, scientific libraries, etc. were to a great extent the responsibility of scientific organizations, both at the national and at the international levels. The lines of emphasis and regulation of the corresponding information flows were not directly connected with the attainment of the economic and social objectives of development, but were dealt with from the point of view of scientific and technological progress.

12. STI lies both upstream and downstream of processes of discovery and innovation, both in basic research (research aimed at increasing knowledge) and in applied research or technical development operations (the chain of action-oriented scientific and technological activities). Upstream, to these processes, the stock of information which builds up is a resource that specialized personnel are required to know and turn to account; downstream, constantly updated information comes into being and constitutes a product, which will be added to the stock. Part of the stock of information will necessarily become obsolete as new advances are made; this process - the obsolescence of part of STI, as a resource - has steadily accelerated, and poses considerable problems for the exploitation of the material accumulated.

13. There is a major difference between STI as a product of pure science and STI as a product of applied science or technological research and development. In the first case, the information is of intellectual value alone; there are few restrictions on placing it at the disposal of the scientific community. The free flow of the findings of pure science is an internationally accepted principle, although one could mention many cases where it has not been respected, particularly when a theoretical discovery was obviously going to lead to applications of great economic importance (certain fields of nuclear physics or solid state physics, for example). In the second case, STI may be a source of processes or products that are profitable to States or firms; as such, it carries potential wealth, and whoever holds it has,

so to speak, a cash value. It may be the subject of inter-group or international exchanges, organized to a greater or lesser extent on a reciprocal basis, it may be patented, or it may even be kept secret. The justification for restrictions on the circulation of scientific findings resides in the high cost of the research work which led to them. But the intrinsic value of these findings is, at the same time, a powerful stimulus for the development and circulation of STI, in proportion to the intensity of the scientific and technological exchanges between countries.

14. This basic pattern is a reminder that the circulation of STI takes place initially in a kind of closed circuit. STI is thus organized in an individualized sector within the system of scientific and technological activities of the developed countries, by a home-grown process, closely linked with the expansion of science, and reflecting the motivations and needs of a very numerous, but nevertheless specific category of users, who are at the same time the producers of results: the scientific and technological personnel, ranging from the highest level of the scientist and the engineer who construct the theories and invent the technologies, down to the modest level of the technician who improves a process. The rising curve of STI, often said to be exponential, is a corollary of the growth of scientific exchanges between individuals and groups participating in the development of science and technology; it has followed an identical pattern in national communities and in the international community.

Imbalances in the circulation of STI and their consequences

15. In pure science, the circulation of information between groups of scientists and between countries has existed throughout history; systems other than formal systems of exchange of documentary material, especially institutions which facilitate contacts between individuals and the machinery of international scientific co-operation, have had, and continue to have, an important role. The potential of countries with a different level of development may, moreover, lie in particular, comparable specializations, as the recent history of pure science has shown: in this case, a healthy circulation of STI begins, stimulated more especially by the major international non-governmental scientific organizations.

16. In applied sciences and in technology, it is impossible to dissociate a country's level of research activities from its level of economic power. In addition, the flows of STI are closely associated with industrial exchanges and trade, in an atmosphere which is by no means free from competition. STI flows are therefore established not only between countries which enjoy similar resources and scientific and technological potential, but also according to the structure, level and policy trends of national economies. The comparable technological level of the industrialized countries, the fact that they have modern and diversified economies, their shared preoccupations with energy, the exploitation of natural resources, land development, health, etc., and the trade networks which connect them, are at once both a cause and a consequence of the expansion of their mutual scientific and technological exchanges and of the intensity of the STI flowing between them.

17. Exceptionally vigorous STI flows were therefore developed and organized exclusively among developed countries, until the 1960s and during the First Development Decade. Despite the existence of major governmental and non-governmental world programmes of scientific co-operation, and despite the significant action taken by international organizations, in particular by Unesco, to encourage them, STI flowed principally from countries with high scientific potential to countries with low scientific potential. The developing countries, which were merely consumers of STI, using it as a resource, could, in fact, make only a small contribution to its development as a product, chiefly owing to their lack of qualified scientific and technological personnel. They found themselves excluded from the circuit of exchanges.

18. This state of affairs is still very widespread as we enter the Third Development Decade, particularly where the poorest countries are concerned. It merely reflects the balance of power. The quantity and quality of STI developed as a product in a country and its ability to disseminate it is one indicator among many of its economic and political power, expressed through its scientific and technological activities. Conversely, a country's ability to draw upon STI as a resource is a yardstick of its capacity to use it for the advancement of science and technology and the increase of its economic power.

19. The existing imbalance in the circulation of STI flows is a real obstacle to the development of scientific and technological activities in developing countries.

(i) Firstly, and from a general point of view, they are likely to lack one of the essential "inputs" which enables countries to exploit their scientific potential (even if that potential is limited by inadequacy of material facilities and by the relative scarcity of personnel). STI, in this respect, is necessary not only as a factual foundation for the practical work of the scientist or the technologist, but also as a stimulus to his creative imagination, which is essential to innovation.

(ii) Secondly, the absence of sufficient flows of STI causes intellectual isolation, which snowballs into genuine indifference to STI: the less well-informed the scientist is, the less incentive he feels to be so; the need is no longer felt, to the detriment of the productivity of scientific and technological work in the form of utilizable results.

(iii) Finally, those items of STI which, despite current obstacles, are available to the scientists and technologists of a developing country, do not necessarily correspond to their areas of concern or to the programmes laid down by the national science policy. On the contrary, the economic dependence which still persists in some countries in areas crucial to development (for example, exploration of natural resources, in cases where the countries are suppliers of raw materials) goes hand in hand with scientific and technological dependence: precisely in these areas, flows of information from countries with high scientific and technological potential are limited on account of the unsatisfactory machinery and conditions for industrial exchanges and trade, as these are still carried out today.

20. From this last point of view, the prospect of the establishment of a New International Economic Order brings radical changes within the realms of possibility. The objective that the international community has set itself is, in fact, to eliminate precisely those most flagrant inequalities that hinder economic relations. Modifications in the circumstances governing exchanges, by giving countries greater decision-making autonomy as regards the applications of science and technology to the problems of their development, create more favourable conditions for an expansion of their own scientific activities, and hence for their broader participation in international scientific and technological exchanges. But this development, which will bear fruit in the long term, is not enough to eradicate, here and now, the effects of the imbalance in STI flows.

21. UNISIST has therefore set itself the objective of creating conditions which will enable the developing countries to have access to the STI available throughout the world, and to utilize it according to the aims of their national science and technology policies. In the context of UNCSTD, a strategy should be worked out for that purpose which will overcome the three current obstacles mentioned above. It finds its place in the usually accepted framework for science and

technology policies in countries whose scientific potential is still limited, namely, endogenous scientific development.

Improved access to STI of foreign origin, and organization of STI at the national level, as factors of endogenous scientific development

22. Endogenous scientific development, an objective which, in the case of the poorest countries, can be attained only in the long term, presupposes that the national science and technology structures are able to function in their own right and to produce advances, discoveries and innovations in accordance with the universal processes governing the growth of scientific activities. It is organically linked with the objectives of national development. Indeed, the tasks assigned to scientific and technological activities by the development policy give special lines of emphasis to the science policy. These concern, for example, the inventory and exploitation of natural energy or mineral resources, certain branches, considered to be of prime importance, of the natural sciences (whether pure or applied), and the development of specific technologies (in heavy industry, processing, food production and agriculture, etc.); finally, in nearly all countries they concern rural development and the increase of agricultural output and food production.

23. Endogenous scientific development is governed by a great many human, institutional and material factors. Obviously, STI is only one of these, and its role, which is part of the whole system of scientific and technological activities, can be fulfilled only to the extent that that system, which is determined by national science policy, is sufficiently well-organized and has adequate resources. Where STI is concerned, we must bear in mind the special importance of the training and conditions of employment of researchers and technicians, who are the users of such information. Indeed, STI does not itself provide knowledge, but only materials that the "expert" must assimilate and develop in the light of what he knows already and his abilities to analyse and create. The relevance of a piece of information is entirely relative, and depends on the person making use of it: this is a major consideration, at the practical level, for the classification, dissemination and development (at the level of secondary and tertiary services, in particular) of STI.

24. Where the international community is concerned, its endeavours to improve the circulation and exploitation of STI will be justified only to the extent that they are matched by efforts to support the development of each country's own appropriate scientific and technological facilities (universities, centres for research, the study and design of equipment, and experiment, etc.); but the converse is equally true.

25. In order to satisfy the conditions for truly endogenous, i.e. self-supporting, scientific development, we must assign two roles to STI:

(i) firstly, the internal circulation of messages in the system of national scientific and technological activities should not only facilitate the work of the individuals concerned, but should contribute to the establishment of a living, vigorous scientific and technological community, among whose members exchanges are constantly taking place;

(ii) secondly, the information should contribute both to the development of basic and oriented research in general, and to advances in specific fields, particularly in technological research and industrial development processes which correspond to the objectives of national science and technology policy.

26. The first step is to establish within the national community the functional cycle which places STI both upstream and downstream of any research activity: any individual or team must in fact make use, at least in part, of the findings that another person or team has obtained as products, in the country itself. The situation, in practice, is not always conducive to the necessary internal exchanges. The splitting up of research on a sectoral basis among various institutions and technological ministries gives rise to compartmentalization, a legacy from the time when some of these institutions were not politically independent. The divisions are both horizontal - between disciplines or specializations - and vertical, between types of research (basic research, oriented research or technological development). Thus, despite the existence, in some cases, of solidly established universities where all branches of science are represented, research in agronomics, for example, remains relatively isolated. The primary object of science policies is to establish coherence and to strengthen the organic links between the various research activities and the various personnel carrying them out, and in particular to establish relations between pure research and applied research, with a view to the pooling of efforts on the themes that it has selected. Organization of the circulation of STI can make a very considerable contribution to the achievement of this objective.

27. It is therefore most desirable that the collection, dissemination and exploitation of STI be centralized, and that a responsible body be designated to deal with all the practical problems that arise in connection with the establishment and running of the specialized centres, scientific libraries and information exchange networks dependent on specialized technologies: what is needed is a truly national STI system to serve the science and technology policy. Moreover, the establishment of such a system is clearly conducive to greater effectiveness. But it is important that it should be established on the basis of a selective analysis of needs, both as regards each research activity individually and the structural linking of the research activities as a whole.

28. The contribution of STI flows to the achievement of a proper balance between basic research, on the one hand, and applied research on priority themes, on the other, poses a problem with regard to access to STI of foreign origin which, in present circumstances, often constitutes the largest volume of useful information. We are faced with a conflict between the objectives to be chosen:

(i) it is clear that the limited scientific and technological potential of the developing countries does not allow their research programmes to cover the whole range of scientific disciplines; hence their documentation needs are not, a priori, universal. One might consequently be tempted to make choices in the enormous volume of documentary material available and promote or facilitate access to STI of external origin only in those particular disciplines or specialized technological fields in which national scientific and technological personnel are actively engaged, or which correspond to development priorities;

(ii) at the same time, it is recognized that the process leading to scientific progress is incompatible with the compartmentalization of the system into narrow disciplines. Research in the basic sciences is becoming increasingly pluridisciplinary, as it is in the applied sciences and technology, for no problem of any magnitude facing the engineer or technician can be solved without calling upon a combination of many and varied techniques. Finally, it is impossible, a priori, to anticipate the nature of STI requirements by the researcher in the course of his research work or technical development process.

29. The practical problem raised by this contradiction is fundamental. Even if there were an economically justified and technically valid solution enabling the user to identify and have immediate access to the whole range of documentary sources which concern his work, he could not exploit the information, i.e. assimilate the relevant data and transform STI into knowledge. It is therefore necessary both to respect the freedom of his intellectual approach - (for "the spirit bloweth where it listeth") - and facilitate, or even guide, his choices.

30. In the developing countries, the objectives to be attained are therefore:

to give the research specialists and technicians in national scientific communities the possibility of access to the whole range of world-wide scientific and technological documentation;

to ensure, more especially, the best possible conditions of access in priority fields and to set up documentation networks to meet specific needs, using certain well known means: document analysis centres, specialized data centres, and, in general, all institutions handling and sorting documentation for a special category of users (secondary and possibly tertiary services).

31. The scientific and technological documentation system that fulfils these requirements can therefore no longer be thought of as a simple "service" of a passive nature, available to the user. It must be properly adapted and play, so to speak, an active role with the aim of increasing the efficiency of scientific and technological work carried out by certain individuals or groups. This problem, which is one of controlling the flows and systems of STI to obtain maximum efficiency of activities in applied research, is moreover a world-wide one: it persists to a certain extent in countries with high scientific potential.

32. UNISIST has already paved the way for the establishment of the necessary conditions for unrestricted access (by developing countries) to world-wide scientific and technological information. It has also cleared the ground as regards the promotion of national STI systems. Within the context of UNCSTD and its work, it is important, however, to point out the specific problems which arise in gearing existing systems to endogenous development needs, as they have been defined above.

Specific problems of adapting STI systems to the conditions of endogenous scientific development

(i) The role of universal STI systems

33. The setting-up of universal STI systems represents a powerful contribution to the promotion of information flow, by enabling scientific and technological users in developing countries to identify directly, through a relatively limited number of communication channels, the sources of information corresponding to their needs. Specialized systems such as AGRIS and INIS are of particular interest to them; it is of course important that the endeavours made to overcome the legal and statutory barriers which restrict STI circulation in these major systems should be pursued.

34. The universal STI systems should be able to collect information from developing countries, even if their scientific and technological production is limited. A number of results obtained in developing countries which have practical importance are virtually lost for other countries of comparable economic and social level because they are not taken into consideration by the universal systems, which often constitute

the most reliable networks for mutual information. Information flows from developing countries should therefore be encouraged and standardization measures which make for the integration of the various systems should be fostered. In addition the national STI systems should be linked organically with the international systems in order to facilitate the receiving as well as the sending of information. A national "focal point" is necessary to that end.

(ii) The exploitation of past information

35. Access to the stock of scientific and technological information accumulated in the recent or more distant past, and which is no longer in active circulation among developed countries, is necessary for the developing countries. Indeed, much of this information is not in itself obsolete, nor are the possibilities of its application; it is merely that the rapid technological change characteristic of the economies of developed countries, the particular circumstances of scientific and technological research work in sccieties which have long since entered their industrial era and the very objectives of these societies have simply removed such information from the field of interest of their scientists and technicians. Furthermore, the energy crisis and the new research to which it has given rise, drawing on our stock of past knowledge, have shown that this situation could be transitory. In order to satisfy the needs of the developing countries, a special effort must therefore be made, particularly at the level of universal systems, but also in secondary and tertiary services, to prevent any impoverishment of this precious capital, and, indeed, to enhance its value through easier access.

(iii) Planning of scientific development and planning of STI

36. Science and technology policy, which defines the objectives and the means of achieving endogenous scientific development, is a determining factor in the choices that have to be made as regards scientific and technological documentation, libraries and related services of all types. Identification of users' needs, the maximum development of internal STI circulation and the choice of techniques and resources to be brought into operation should be the object of joint decisions between those responsible for scientific and technological activities and those in charge of STI development. In cases where planning of scientific potential already exists (training of personnel and their employment, equipment and infrastructure, development of centres of excellence and specialized research institutes, etc.), the planning of the STI system should obviously be brought into line with it. Furthermore, it is important to stress that, just as no one single model exists for endogenous scientific development, neither does it exist for the development of scientific and technological information networks.

37. In their plans for the development of scientific potential, those responsible for planning scientific and technological activities should assign STI the importance which its role in the advancement of knowledge and techniques warrants. STI should not be considered as a mere supplier of services, justifying the piecemeal allocation of resources as the needs of the research programmes arise. Its role as a stimulus to creation should be taken into account. To avoid any possibility of STI ever constituting a limiting factor to endogenous scientific development, it is important that sufficiently long-term plans be drawn up.

(iv) Data on experience built up by the population

38. It is common practice to emphasize the need for developing countries to collect data on their natural resources - for example, on land and water resources and the physical environment - which are vital to research in agronomics and agricultural

progress. Another category of equal importance concerns the techniques used by the population and the experience which they have accumulated in their traditional way of life, particularly in rural areas. Thus research undertaken in many countries into therapeutical products of local origin (with the aim of placing greater importance on certain plant resources and of fostering a type of medicine which is better suited to socio-economic realities) has recourse to ethnobotanical data. The same approach can be used in the promotion of small industries. The collection and circulation of data of this type without which certain research programmes cannot progress, can therefore represent key elements in technological progress. Particular attention should be given to them in the organization of STI. In this respect the contribution by certain foreign sources of documentation and information should not be neglected, for, due to historical reasons, these data have sometimes been compiled in foreign organizations.

(v) Motivating the research worker

39. Among the handicaps to be overcome is the lack of motivation on the part of researchers in regard to STI (cf. paragraph 19). Science policy has a number of indirect ways of creating interest: encouraging publications, fostering direct relations between individuals, which in their turn stimulate exchanges, the twinning of institutions, etc. Nevertheless many practical conditions which have a direct influence depend on the organization of STI. There is, in the first place, the convenience and efficiency of information networks made available to scientists and technicians; and in the second place, the association of such personnel with the activities of secondary and tertiary information services, which require specialized scientific skills. As a general rule, scientific personnel should be introduced to the practical problems of STI as a professional specialization, and mobility between information and scientific services should be encouraged.

(vi) Economic aspects

40. Economic justification of the efforts to promote STI at the national level with a view to endogenous scientific development cannot be based on cost-benefit estimates, because STI constitutes an input in a system where its use is exclusively intellectual. The indirect benefits, in terms of research results which can be applied to socio-economic development, of an STI network geared to the system of scientific and technological activities and catering for the needs of the researchers, can in no way be compared with its cost in investment and operation. The only valid method, from the point of view of allocation of resources, consists in seeking a judicious balance between outlay in respect of training and employment conditions for scientists and technicians, the necessary infrastructure and material equipment for scientific work, and scientific information itself. Available evidence would suggest that in countries with a high scientific potential this balance has been reached by the very importance which is assigned to scientific research carried out for economic objectives, and considered in its entirety. In the developing countries, as we have seen above, the conditions for arriving at a balance of this kind have not yet been established. In general, it may be considered that the financing effort in these countries is directed primarily towards investments in materials, apparatus and equipment and the training of personnel or research workers, rather than the STI system, which has not always been assigned priority in keeping with its importance.

III. STI, DEVELOPMENT POLICY AND THE CIRCULATION OF INFORMATION NECESSARY FOR THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT

Introduction

41. Development slanted towards the achievement of the aims of society involves recourse to the products, processes and practices resulting from science and technology in all sectors of economic and social activity. The results of science and technology can, however, be used only as one means of action among many others - political, legal, institutional, etc. - the ultimate goal being to serve man in accordance with his specific cultural conditions, needs and aspirations.

42. Communications in general together with networks for the exchange of information of every kind fulfil essential functions in development activities: they ensure, on the one hand, the two-way circulation of messages between the authorities responsible for development policy at all levels and citizens, and, on the other, relations between groups and individuals within the national community, development of which is the concern of all.

43. Of the vast range of problems raised by the content and flow of information bearing upon development activities, UNISIST deals only with those relating to the spread of scientific and technological progress in society. The first aspect of these problems considered in part II above concerns endogenous scientific development and messages whose content is essentially scientific and technological. The second aspect, considered hereunder, concerns the whole range of messages of varying content whose circulation is necessary to ensure that the results of science and technology obtained in a country by means of original research work or through the adaptation of existing techniques, or again, imported from abroad without being developed in any particular way, may be used effectively in development activities. The nature of these messages and the conditions governing their circulation need to be defined in their broad lines in the light of the varying needs of users distributed throughout society.

44. From the point of view of the intended recipients of the messages, three groups need to be considered:

(i) all citizens, regardless of their place in society: they must be receptive to the possibilities afforded by the application of science and technology. So far as the population is concerned, this implies a responsive attitude to the material changes in practices and ways of life which are attendant upon all technological progress. So far as the development authorities and personnel are concerned, this involves adequate pre- and in-service training. The requisite information flows necessarily involve recourse to STI;

(ii) those responsible for development planning and programming, who generally belong to governmental institutions, and those in charge of the design of public or private development operations. They have to contend with the problems arising from a multiplicity of practical aims (relating to production, the development of natural resources, the improvement of public health, land use planning, etc.) and they therefore have reason to collect both socio-economic data and information concerning the possibilities afforded by science and technology, firstly, for pinpointing the problem in all its aspects, secondly, for selecting ways and means, and, lastly, for analysing the consequences

of a particular choice in regard to processes, techniques or practices. STI is but one component of the complex information system which, in the final analysis, will enable the decision to be taken. The same level of responsibility is involved in the matter of information needs relating to the supervision and monitoring of the execution of programmes and operations and to their evaluation;

(iii) the third group, established on a different basis, comprises individuals, communities and institutions of every kind engaged in activities serving development in a particular sector with technological, economic and social characteristics. Mention will be made here of only two of the most important sectors: industrialization and integrated rural development. The circulation of information must be geared, at the sectoral level, to the particular needs of a large number of users with specific occupational backgrounds of different kinds, but with common concerns and goals.

45. As national development policy takes account of economic exchanges and external political relations, it is important, so far as information for development is concerned, to take into consideration the links formed between countries of the same region or countries that have assigned themselves comparable objectives. As has already been noted in regard to the development of the scientific and technological potential of the developed countries and the economic factors that stimulated it, exchanges of information of every kind between countries in a similar situation and with similar policy trends have every chance of being effected in a balanced manner; the effects of dependence resulting from inequalities in the power of the more advanced countries and the developing countries in the particular field of the circulation of information for development, may thus be offset. In addition, in seeking their own development models based among other things on the utilization of the results of science and technology, the developing countries are led to refer to the experience of other developing countries, to which they are linked by the similarities between them. There is therefore a need for technical co-operation among developing countries in respect of the identification, collection and utilization of the information required for development planning and management.

The role of STI in satisfying the educational and cultural needs of a development policy which makes use of the output of science and technology

46. STI, originally a resource and a product in the limited field of scientific and technological research activities, has become in every country an important resource for teachers, educators and instructors in both formal and non-formal education. General and specialized scientific and technological education is plainly one of the principal factors contributing to endogenous scientific development. It is also necessary in order to create in those not engaged in scientific activity an attitude of responsiveness and motivation in regard to its applications, and this holds good not only for the plain man in the street, at his own level, but also for non-specialized senior personnel required to deal with science and technology.

47. Ministries of education and technical ministries in that field of education of concern to them (health, agriculture, various techniques), have their own institutions for preparing teaching materials that can be used at the various levels; they have access, through libraries or the documentation assembled in universities or research centres, to conventional resources, of either national or foreign origin. Nevertheless, when one considers needs from the point of view of the utilization of science for development, an intensification of STI flows towards teaching personnel appears desirable. Although at the elementary and secondary levels, at which

education is of a general nature, there are only a few problems, the same is not true of the training of engineers and technicians or of senior development personnel who have to take into account the very latest advances in science and technology. The active dissemination of information from tertiary STI services in particular, in accordance with the lines of emphasis of development plans and national science and technology policies on the one hand, and the qualitative needs of training on the other, would make it easier for the competent education services to update the content of education, particularly from the point of view of curricula and textbooks. The same intensification of information flows to serve the needs of education in the human and social sciences is also to be desired. Obviously the teaching community itself needs to be motivated in this direction.

48. The creation of the human and social conditions conducive on the one hand to endogenous development (e.g. by giving encouragement to prospective scientists and technicians) and, on the other, to citizen participation in technological progress, in directions that are consonant with national priorities, depends to a great extent on the mass media. In this field too, journalists, radio broadcasting personnel, etc., need to be given easier access to synoptic information on matters of current concern. Here again, an active attitude on the part of documentation services would be desirable. In countries where the communication and information sector is already fairly powerful and that possess an active national press, specialized publications, etc., it is obvious that particular attention should be given to the needs of scientific and technological extension work in the general sense (and not in the restricted meaning of this term, as in a specialized field of activity such as agriculture).

The role of information in development policy-making and planning and in the design and management of development programmes

49. In order to decide on the main lines that development work should take, judiciously calculate its costs and optimize its effects on society and the individual, recourse must be had to a largely interdisciplinary methodology. Economic growth, while being an essential component of development, is not all there is to development, and must go hand in hand with social change in directions that reflect aspirations towards the improved well-being of the societies concerned. Development, a complex and multidimensional process, involves at the scientific, technological, economic, social, educational, material and political levels, a large number of interactions that must be controlled within a coherent framework. Planners, decision-makers and managers must not only ensure the dovetailing and compatibility of the different "sectoral" objectives but they must also regularly ascertain the degree to which each of them can be achieved in the light of the direct and indirect consequences of the action undertaken.

50. The planning, management and evaluation of development calls for theoretical and practical knowledge and for a mass of data describing the basic situation, all of which can be used for forecasts covering varying lengths of time, without favouring any one area. In particular, those sciences and forms of technology whose contribution to development is fundamental, and in some respects decisive, play their part not only on their own account but also as social practices bringing into play a series of human actions or reactions in individuals and groups. Science and technology strategies cannot consequently be drawn up with an eye simply to technological domination of the physical world and of the actual conditions in which human activities take place. Scientific and technological information and the knowledge of scientists and engineers, as well as information and knowledge in the social and human sciences, exercise an influence only when made use of in a combinative system within which no discipline - and this means economics especially - stands above any other. The combinative system is itself merely an instrument for determining global development strategy.

51. A generally recognized failing, noted in Unesco's Medium-Term Plan, is the inadequate allowance made for social and cultural factors in decisions concerning development whenever these decisions affect planned options or programmes. The reasons for this failing are of three kinds: the pressure of the most immediately felt limitations, which prompts encouragement of economic expansion, particularly in the industrial sector, and a consequent over attachment to achievements due to technological progress; the imperfect development of planning methods with regard to allowance for social factors; and the scant involvement in the technical preparation of action, of those who are abreast of social realities or can interpret cultural values. It is important to correct this tendency in all activities serving national development policies. This particularly applies to information systems, which, as suppliers of an element essential to programme planning and preparation, must be able to meet demands evenly balanced among the various approaches - scientific and technological, economic, social and cultural - and, above all, not introduce, on account of their structure, any prejudicial distortion.

52. The above considerations point to the problems faced by UNISIST in its particular field of action when seeking to fulfil its assignment and to meet the objectives of UNCSTD regarding application of scientific and technological advances to development. A few principles make this possible:

(i) the integrating role of agencies responsible for development at the highest level (e.g. ministry of planning) is not compatible, in practice, with the direct use of the great multiplicity of data associated with the preparation and management of a development policy. The balanced and mounting information flows must obviously be arranged in order of importance and the organization of information networks clearly needs to parallel that of the preparation of decisions;

(ii) recourse must be had at all levels to data reflecting the real situation, updated wherever possible, without any exclusive user being designated from the outset for each category of data. Population figures, agricultural or industrial statistics and health statistics, for instance, are concurrently necessary for all integrated operations. The centralization of data (data banks) will facilitate access and check any undesirable trend towards sectoralization in responses made to global issues;

(iii) scientific and technological information is, where appropriate, dealt with under a specialized system managed by the authorities responsible for scientific and technological activities, or by major agencies contributing to endogenous scientific and technological development. The outcome may be a degree of isolation and difficulties of access, which must be remedied by vigorous dissemination activities, especially by the tertiary information services. A similar effort is needed from other highly specialized systems, such as those in the area of health;

(iv) lastly, the way in which institutions in the developing countries in fact operate means that a great many real-situation studies and detailed data (local, in particular) and even theories that may give rise to new ideas, are scattered throughout case studies - with a low circulation at the time of issue - drawn up by foreign or national consulting firms. Identifying, indexing and facilitating the use of

these reports is an important task which may come within the scope of the planning ministries themselves, as is already often the case. It is nevertheless important that their subject-matter should also be incorporated into the stock of readily accessible information.

53. The interpenetration of internal or national, and external or international, factors in situations which may just as well assist as impede the development effort, obliges the authorities responsible for development policy to be very much on their guard. The problem thus presented to information systems in respect of information originating abroad in the exact sciences, and in the social and human sciences, has innumerable facets. The relevant information is often identified on the basis rather of particular sensibilities (e.g. in the political and economic fields) than of objectively defined needs. As in the case of any information for development purposes, it is important that information flows from abroad should, overall, be balanced among branches of activity and disciplines, and this should be made easier by a centralized information policy backed by international co-operation.

Information with a view to industrialization, technology transfers and control of imported technologies

54. Decision-making processes are particularly complex in the industrialization sector. Under national planning and programming, objectives are defined mainly on the basis of fundamental economic and social options (higher living standards, balance of payments, development of natural resources, employment policies, physical planning, etc.). In market economies, however, the initiative also rests with private entrepreneurs. Finally, the likelihood of pressure from foreign interests or transnational corporations, which is inevitable in present trading conditions, cannot be overlooked.

55. Even in structures where the scientific and technological potential of a developing country is high and its endogenous scientific development is already attuned to national priorities, some of the technology used (and this, as it happens, is true of many industrialized countries) is more or less entirely of foreign origin: machinery is imported and some products are intended for export and have to match up to specifications - whatever their degree of transformation from raw materials - laid down by foreign markets. Besides, there is no national research facility able to take charge simultaneously of development in all branches of technology.

56. This recourse to foreign technology, compulsory in varying degrees but always necessary for some industrial products, presents the authorities of developing countries with a particularly sensitive problem. The technology, manufacturing methods and production lines to be used by the national industry have not always been designed in a social and economic setting comparable to that in which they are to be applied. They are often far removed from local practice, make demands in terms of new know-how (even when education has been slanted towards industrialization) and, above all, imply profound changes in the attitudes of the various people bringing development about and of the workers. The social repercussions of their application may be considerable. Even if we assume that, as technology, the imported technology is recognized to be fully suited to production objectives (which is not always the case for reasons of physical environment, investment profitability and labour employment conditions), decisions concerning it must take a great many socio-economic data into account. They must also take account of the effects of the adoption of this technology on the social and human environment and on the balance between sectors (rural and urban, in particular) in the context of harmonious development which meets the aspirations of the population as a whole.

57. The main requirement regarding information is therefore to possess the whole range of data needed for decision-making. Scientific and technological information originating abroad, scientific and technological information of home origin (e.g. on the possibility of using local raw materials), ready-existing national statistical, administrative or legal data (consideration might be given to having this available from a data bank) and, where appropriate, fresh information from surveys, should be amalgamated and combined.

58. Access to information should make it possible to consider three points in the pre-decision studies:

(i) the profitability of imported technology, on the basis of the financial costs of the transaction (charges, purchase of know-how) and of the real costs induced by the transfer (e.g. technical assistance). This is an economic responsibility;

(ii) the soundness of the imported technology in the actual situation where it has been used, on the basis of an evaluation which may give rise to technical modifications for the sake of improved adaptation. This is a scientific and technical responsibility;

(iii) assimilation of this technology, on the basis of a forecast of the practical conditions in which it will be used. This is an organizational and managerial responsibility.

59. The relative importance of these three study areas may, of course, vary. There is, for instance, a major difference between the case of a purchased "turnkey" factory and that of an existing local business seeking to improve its performance. Each area naturally affects the other two.

60. The users of the information needed to prepare the study belong to different occupational groups. Their needs, however, have features in common.

- Information must be supplied to them in organized "packages", the substance of which goes well beyond what is usually provided in science and technology information, that contained in patents or even what is to be learnt from contracts between countries of the same level of industrial development regarding know-how.

- Alternatives or options should be open to them.

- The information access system should be sufficiently open and flexible to enable them to answer what on the face of it are unforeseeable questions, particularly with regard to the local impact of imported technology, that is, for home-based information (including administrative and legal data).

61. In order therefore to suit a country's information and data-gathering systems to the needs of those responsible for industrialization, two things are needed: accurate knowledge of the distribution of responsibilities and powers in the organization preparing the decisions; and a method accepted by all the members of that organization. The organization may come higher or lower on the scale, and may be the responsible ministry or government institution, the management of a major national company or, more modestly, a group or association of producers or a private concern. The method, on the other hand, should in all cases be identical in its basic approach. To illustrate this, Table I lists what has to be done in the most general case, namely choosing the requisite technology for the attainment of industrial objectives under national development planning, and the types and sources of information needed for the purpose.

Table I

ACQUISITION OF TECHNOLOGY

Subtasks	Information required and sources (illustrative)
1. IDENTIFICATION OF TECHNOLOGY NEEDS	
1.1 Inventory of technology in use - traditional, locally generated, and imported into the country.	Information needed on existing surveys and reports of R & D work and of technology in use and in the process of development in the country. Details of national, regional and State development plans, projects and forecasts.
1.2 Assessment of technologies in use in relation to their relevancy to development objectives and priorities.	Sources of information: institutional reports or national up-to-date directory/ register of R & D work done and technology generated; patents taken and applied for; profiles of innovations licensed for commercialization; registry and profiles of industries in different sectors; registry of foreign collaborations, import and export of technologies, goods, services, etc.; queries received by technology innovation banks, industrial development banks, technology information centres, small enterprises assistance and advisory bureaux, documentation and information services, technology transfer centres, institutions of higher learning, R & D establishments, etc.; central and State government departments; agencies concerned with development planning, rural development, R & D, industries, commerce, industrial licensing; international assistance programmes and missions.
1.3 Identification of irrelevant and superfluous technologies in use in relation to development objectives and priorities.	
1.4 Identification of technology gaps in relation to the country's programmes and needs.	
1.5 Inventory of technology needs in relation to development objectives, plans and priorities.	

Subtasks	Information required and sources
2. TECHNOLOGY ASSESSMENT AND EVALUATION	
2.1 Assessment of indigenous technology development capability.	Information on national, regional and State survey of industries, industrial and technology development potential, resources, etc., sectoral surveys, R & D projects, achievements, and feasibility studies, project reports, etc. Basic types of information needed include descriptions of technologies and of end user and uses, advantages and disadvantages, production volume and value, costs, investment and labour, etc.
2.2 Survey of alternative technologies and alternative sources of technologies.	Information on alternative technologies including data on minimum costs, terms and conditions, technological specifications, guarantees, delivery and implementation schedules, resources requirements, etc., needed for evaluation and selection of projects at enterprise level.
2.3 Technology assessment - that is, the systematic analysis of the anticipated economic, social, environmental, and technological impact when a technology is introduced, modified or extended.	Technology assessment requires analysed data on the impact of the technology being assessed under different environmental conditions including information on employment potential, foreign exchange components, resource utilization, social implications, demands on training and education systems, and contribution to the quality of life. Technology assessment being closely associated with long range or strategic planning, information on socio-economic planning methodology, the scientific and technological resources necessary for implementing a decision and of the potential impacts on skills and expertise and the spin-off that may arise from the technology application would be helpful.
2.4 Technology evaluation - that is, matching each of the suggested alternative technologies with the technological needs and problems on hand in terms of the technical, financial, manpower, and other parameters.	Information on developments in technology related areas both within as well as outside the country helpful in formulating national policies on foreign investments, contractual arrangements for technology transfer, local R & D effort, and initiation of public projects.
2.5 Technology selection - that is, analysing the technology package available in relation to its suitability including social relevance, costs, and other attached conditions, and selecting the most appropriate technologies, guided by national policies.	

Subtasks	Information required and sources
	Technology evaluation needs information about markets and technology descriptions on factors which determine the applicability of the technology under local conditions - e.g. raw materials, equipment, costs of labour and training, sources of energy, supplies, finance, availability of engineering, construction, and testing facilities.
3. TECHNOLOGY TRANSFER ARRANGEMENTS	
3.1 Identification of the level and direction of transfer within a country, intra-regional, or global; horizontal or vertical.	The modes of technology transfer to developing countries include direct importation of machinery and goods embodying technology, hiring of foreign technologists, experts and consultants; direct investment by multinational corporations to provide technology along with other industrial inputs such as capital and managerial skills; joint ventures in a third country; licensing or other similar contractual arrangements with foreign governments and enterprises. Technology may also be transferred as verbal formulae, generalized concepts and data useful in product design and development.
3.2 Selection of appropriate methods and channels of technology transfer and diffusion.	
3.3 Demonstration of the application of the new or imported technology in the local environmental conditions.	
3.4 Adaptation of the technology to fit local conditions and requirements, if necessary.	
3.5 Development of indigenous R & D capability and technological capability for the productive use of the new technology and generating further useful technologies.	Technology transfer mechanisms include movement of people between scientific, technological and industrial enterprises; spin-off from new missions and projects; scientific and technical publications, such as, books, journals, reports, directories, patents, standards, specifications, engineering drawings, trade literature, etc.; mass media exhibitions, fairs, demonstrations, get-togethers; interaction of customers and suppliers; sales and marketing; consultancy service; scientific and technical meetings: conferences, symposia; training courses, on-the-job training, workshops, extension services; technology banks, information centres; proving plants; centres of excellence, etc.
3.6 Incorporation of the adapted technology into the regular production system.	

Subtasks	Information required and sources
4. TECHNOLOGY MANAGEMENT EVALUATION	
4.1 Formulation of criteria and periodicity for evaluation with special reference to development goals.	Data and information on operational experiences with various technologies in the country as well as in other countries under similar environmental situations. It should be factual reliable information on the context and conditions of application of the technologies, the inputs, the experiences, the problems encountered, solutions, if any evolved, the results - goods services, know-how, social costs and benefits - identified.
4.2 Organization for and implementation of the evaluation programme.	
4.3 Adjustments in the technology management process on the basis of findings of the evaluations.	Information on methods of technology management evaluations.

62. In many developing countries no approach of this kind - nor any comparable systematic approach, bearing in mind the dimensions of the problem being dealt with - has yet been adopted. Pre-decision studies lack depth, particularly in the case of small enterprises, and the actual need for multiple-facet studies is not always felt. In some cases, the attitude towards scientific, technological or other information is not sufficiently critical; in others, factors for which no information exists are disregarded.

63. It is therefore important to stimulate the interest of all those working to bring industrial development about, and those responsible for it, in the use and exploitation of documentary sources. This should be done in the more general context of the incentives adopted by countries for the industrialization and modernization of production techniques (by economic, fiscal or legal methods). There is a need for "information about information" as a resource which contributes both ideas and aids to forecasting, and hence a greater assurance that the right policies will be chosen. This should be accompanied by an introduction to relatively sophisticated decision-making techniques.

64. The technology transfer centres, whose establishment is contemplated, would help to solve these problems. They would be the primary users of information of foreign or national origin. From this point of view they would therefore have to link up with the institution acting as a national focal point for information flows from international systems, the information network of scientific and technological research establishments, and the services which collect socio-economic data, or data banks, if such exist. Whatever the exact role assigned to them in the collection and dissemination of the information needed for industrialization, a role which will probably depend on the structure adopted for the national information system, these centres, staffed by specialists, might assist the tertiary services processing the information of all kinds required for technology transfers. However, bearing in mind their main purpose, the hard core of their activities would be the utilization of scientific and technological information, expanded to include the information packages, as noted in paragraph 59 above.

65. Information flows in support of decisions to transfer technology should not be envisaged solely as proceeding from the supplier of technology to the receiver. The flow in the opposite sense should be stimulated. A better appreciation by the developed countries of the special difficulties encountered in technology transfers, not only of a financial or economic nature but also, and above all, of a purely technological, sociological or cultural nature, will make it possible to put co-operation on a sounder footing.

66. Lastly, on the same lines of thought as those guiding the search for a New International Economic Order, the flow of information from developing countries in connection with technology transfers linked to specific operations, should enable countries with substantial industrial potential to embark to a greater extent on technological development and research specially suited to the specific needs of the industrialization of developing countries. STI exchanges brought about by technology transfers might be taken advantage of generally in order to stimulate international scientific and technological exchanges which would not be linked with either financial dealings or short-term economic considerations.

The role of information in rural development and the participation of rural populations in the advancement of agriculture

67. Applying scientific and technological advances to development in the rural sector requires conditions different from those needed for development in the industrial sector. Whereas the spread of technological advances in industry takes a relatively short path, with technical development operations providing results directly usable by firms, the spread of technological progress in agriculture is a slow and complex process. Changes in agricultural practices, which are a prerequisite for improving production, or productivity, require the approval and participation of a great number of individuals concerned with farming, scattered over frequently vast areas. These changes take place at the grass roots, even if they are the result of very sophisticated research, as is the case, for example, with the use of new varieties of plants and selected seeds obtained from genetic studies and experiments at a high scientific level. A special system of agricultural advisory activities, organized by all countries in their own particular way, makes known the findings of applied technology in rural areas. In fact, knowledge of technology is spread by all those who work with or train people engaged in agriculture, especially those in rural institutions like co-operatives. This knowledge of technology is structured on the basis not only of scientific and technological information but also of socio-economic information, since it must be appropriate to the particular situation of the people for whom it is intended.

68. Other features specific to the structures and institutions involved in the rural development of developing countries play an important part in circulating the information required for the application of the findings of science and technology in this sector.

(i) The necessary technical developments for agriculture, animal husbandry, land and water utilization, the modernization of agricultural practices, etc., are worked out and tested in the countries themselves, which all possess establishments for oriented and applied agricultural research, experimental stations, and facilities for the collection of data on natural conditions and production (for example, agricultural and meteorological networks, inspection of crops). It is true that the import of technologies which are foreign, or based on foreign models, can be decisive, both in modern export-oriented agriculture and in food, the cultivation of crops (for example irrigation, the use of fertilizers and pesticides), and flows of scientific and technological information from abroad should be used to the full. It nevertheless remains true that the organizational problems arising in connection with information are mainly those of internal circulation within a highly complex and dispersed system of institutions and services.

(ii) Rural development planning and the programming of agricultural development operations are generally instigated by the State, even when encouragement is given to initiative by local authorities or private bodies. In relation to the size of the territories and the population concerned, decision-making centres are few in number and are frequently centralized and organized on a hierarchical basis. Thus a sophisticated organization may be involved when it comes to the information required for decision-making. It should also be noted that agricultural research bodies, and the survey services frequently associated with them for the particular purpose of studying the socio-economic aspects of rural development, will be the most natural bodies with whom the authorities at the various levels can discuss the possibilities afforded by the applications of science and technology.

(iii) Rural development involves a great number of activities of an economic or social nature, which are only indirectly related to technological progress in agriculture. Policies governing agricultural prices, the provision of rural infrastructures and physical planning, and incomes and employment in rural areas, are very obviously just as essential as appropriate technology policies, although, of course, they react on each other. Such policies, and their accompanying incentives, are brought to people's notice by the mass media and by political information channels. Thus the information which is the subject of UNISIST activities contributes only part of the information whose circulation promotes rural development. As regards public information policy, it is only one element among others.

69. The foregoing analysis has shown that in the system of information covered by UNISIST, clearly defined subsystems exist, having their own objectives and characteristics and catering for the needs of specific users. There are three such subsystems: the subsystem linked to research; the subsystem linked to planning; and the subsystem linked to circulation and to public participation.

70. The subsystem linked to research and surveys, particularly to applied research and experimentation and to socio-economic analysis, is organized, as has been seen above, in the context of specialized bodies. These bodies implement the science policy relating to research activities which benefit rural development. Information of foreign or national origin provides material "downstream" for the work of researchers and technicians. The flow of information should contribute towards endogenous scientific development, in the circumstances considered above in section II, in respect of the group of very numerous disciplines of use in rural development, which include the social sciences and the humanities. It should be noted that international and regional co-operation is highly developed in the basic sciences (genetics, soil science, hydrology, zootechnics), which provide a foundation for applied research on animal and plant production, and that there are specialized international documentation centres dealing, for example, with the major industrial and food crops. The problem of access to information of foreign origin, while not completely solved, is not in itself one of the most critical.

71. The specific difficulty of this first network consists in the extreme diversity of the research subjects, the interdisciplinary character of applied agricultural research, and the scattered location of the experimental stations, which cover land used for very varying agricultural purposes. The flow of information should constitute one of the means for achieving co-ordinated and consistent research programmes and activities, as regards both their planning and their execution. This flow should also establish the necessary communications between laboratory research, or research in major investigation centres, and field tests. In this connection the obstacles to be surmounted in many existing systems of organization remain very real (for example, in the case of the integration of agriculture, forestry and animal husbandry), and call for action, particularly at the level of secondary and tertiary information services.

72. The information subsystem linked to research has an essential part to play in the development, as a product, of information which is not only scientific and technological but also socio-economic, and which can be used both by planners and by extension and information workers, that is to say by the other two subsystems described below. This link-up can be regarded as one of the key points of the contribution by information systems to the application of science and technology to rural development.

73. The subsystem linked to rural development planning and the programming of major agricultural development operations must meet the needs of users who are responsible for preparing sectoral development policy and who frequently also contribute

towards its implementation. Socio-economic data, global and by regions, frequently even local, are of paramount importance. Most of the problems referred to (paragraphs 49 to 52) concerning planning in general are to be found in connection with rural development, particularly the problem of access to non-formal documents, often prepared by foreign survey services.

74. At this high, decision-making level, all the factual up-to-date information which describes a local situation needs to be compiled, including information about medical and social facilities, housing, ownership structures and communications. Above all, it is important to know what people want and what circumstances are needed for them to participate. An upward flow of information from the relevant services spread among various government organizations and coming under several ministries, should therefore be facilitated. As has been seen in the case of planning in general, this can be helped by the existence within the national information system of a general-purpose data bank.

75. A large proportion of the information on the basic situation, needed to arrive at a true picture of present circumstances, comes through administrative communication channels. However, the information subsystem linked to the provision of information to the public, has its own highly important part to play (see below, paragraph 77), particularly as regards the data required for the choice between technological options.

76. The subsystem linked to the spread of new agricultural techniques among the population requires people of different professional backgrounds and of different levels, such as extension workers, generally specialized in one crop or one technique (industrial or food crops, mechanization, irrigation, seed selection, pest control, etc.); agricultural and cattle-breeding advisers, instructors in centres for young farmers, etc. The duties of these people are laid down precisely, and the information they must transmit is prepared by the specialized services, closely linked with research and experimental bodies or subordinate to them. In the preparation of documentary or audio-visual materials used for extension work, and training, a variety of technical and socio-economic information is made use of, but this constitutes a highly specialized and distinct activity.

77. The frequent contacts of extension workers and instructors with the farmers, with whom they must be able to dialogue, and the clear trend towards entrusting them with increasingly varied duties, almost amounting to rural community service work, are arguments for strengthening the flow of information, generally limited, that is earmarked for them. The documentary resource networks, libraries, etc. could be made more accessible to them and advantageously so.

78. This category of development workers likewise has an essential role to play in the transmission of information from the grass roots to those responsible for rural development operations and to researchers and technicians (the subsystem linked to research). To be more precise, any rural development operation whatever, no matter how carefully prepared, must be planned as requiring adjustment in the course of its implementation. It is by no means a foregone conclusion that the rural population will accept a new technique outright, on any scale, whether it is irrigation, crop diversification, the use of fertilizers, etc. Approaches or techniques must be adjusted to practice.

79. On a higher plane, it is essential to elicit the genuine involvement of the farmers in the changes being introduced and even, using methods in tune with the human objectives of multidimensional development (cf. paragraphs 49, 50 above), to arrange the way in which technical actions are successively undertaken in the

light of the aspirations and the resourcefulness of the groups concerned. Thus, stimulation of a rising flow of information, which may be dependent on the system of the mass media, constitutes one important aspect of a rural development policy.

80. Regardless of the ways and means adopted by the rural development policy to meet this problem and the role assigned to extension workers in that connection, the experience acquired by them should not be lost. The information system should be in a position to record it. Measures for organizing the system of extension work and training are required in this respect, but channels for the gathering, transmission and processing of information available at the grass roots must also be envisaged.

81. Where rural development is concerned, the exchange of experience - in the sense of the entire body of factual information, appraisals and assessments and scientific and technical analyses of an operation, whether successful or not - has far greater meaning than the exchange of isolated pieces of information limited to a particular technique. Developing countries in the same region, especially those located in comparable ecological zones, are already co-operating fruitfully in this way and making an invaluable contribution to agricultural progress. It is important that the procedures usually followed for co-operation between countries or for international co-operation, should be based to an increasing extent on the sharing of experiences through a systematically planned and organized network for communicating information, supported by modern information techniques.

Information technology at the service of "information for development"

82. The rapid advances in informatics, communications and related information-handling technologies have become an important factor in the design and implementation of information systems and services, notably those stimulated by Unesco. UNISIST was conceived in the dawn of the computerized information processing age; bibliographic systems presented then several experimental aspects, and computer technology was in its adolescence. But since the years when UNISIST was established, the growth of communications technology has been explosive. The number of data bases, both bibliographic and non-bibliographic, has increased dramatically.

83. Equipment manufacturers have made spectacular advances in computer storage, drastically reducing costs. Interactive man-machine dialogue or "on-line" searching has prevailed over the "batch-processing" methods of the earlier computers; the number of on-line computer terminals used in the United States of America for information retrieval increased from 500,000 units in 1972 to more than 1,500,000 in 1977. Telecommunications networks connecting remote viewing consoles with centralized computers now cross national boundaries, even oceans. For example, the European Economic Community, in association with the national telecommunication bodies, has developed a co-operative network, EURONET, for the sharing of multiple data bases supplied from organizations in Member States. Practical experience gained through such organizations as the European Society of Information Disseminating Centres (EUSIDIC) and its American counterpart ASIDIC, has added to our information on information systems costs and utilization. Commercial brokers offer time at modest costs for the "on-line" searching of multiple data bases.

84. So far, the bulk of experience has been with bibliographic systems, most of which are based on traditional abstracting and indexing systems. Experience with numerical data banks has been relatively small as they are costly to prepare and many of them necessarily cater for a small, specialized market. Use of information technology for other types of systems is relatively underdeveloped, though it can already provide directory-type information for referral purposes, the transmission of texts, and the storage and retrieval of information in text form.

85. Successful demonstrations have shown it to be technically feasible to interconnect continents through satellite telecommunications, as in the Unesco-sponsored demonstrations which permitted Indian scientists in Bombay and Moroccan users in Rabat to search the European Space Agency's data bases in Rome. Much has been learned in the intervening years of the managerial aspects of this man-machine technology.

86. Nevertheless, the utilization of new information-handling technologies in information systems and services in developing countries present certain problems. The principle of appropriate technology applies to information technology as much as any other, and in many cases the ingenious national use of simple technologies may be more appropriate to some tasks than most sophisticated and advanced ones.

87. Predictions about future developments in information technology are hazardous because the establishment of a new technique depends on many features, notably cost, convenience, ease of learning to operate, and above all, appropriateness to the need. However, some predictions may be attempted with confidence because the pace of development is extremely fast, its scope is wide-ranging and the two main techniques - computer and telecommunications - are complementary and assist each others' development. It is reasonable to suppose that at least some, probably most, of the advances briefly mentioned in the following paragraphs will enter practice on a large scale over the next 5-10 years. International co-operation and programmes can help bring these technologies within the reach of countries and help select and adapt them to local needs. Advances most likely to be achieved can be grouped in three areas: telecommunications, computers, and networking.

- Telecommunications: increased use of satellites for long-distance links with increase in capacity of satellites and reduction in costs; improvements in line transmission (packet-switching and digital system); and new methods of transmission, such as optical fibres.

- Computers: improvement in mini- and micro-computers, for handling of small data bases and data banks and for increasing computing activity at terminals of on-line systems; new methods of storage, such as "mass" storage, video-discs, holographic storage, providing large-scale, cheap storage and stimulating more local processing; word and teletext-processing, permitting storage, amendment and reproduction of texts at all stages of preparation and use and, in some systems, making packages of textual information available on ordinary television screens through the public telephone network non-impact printing, making possible cheap printing of small quantities on demand.

- Networking: rapid development and increased sophistication of networks for information retrieval; development of reference and copying networks between libraries as facsimile transmission systems provide greater resolution of images at lower costs; growth of networks for handling cataloguing and other housekeeping data for libraries.

88. These actual and potential advances of information technology are of great interest to developing countries because they represent a long range investment which contains the promise of quick, cheap access to large stores of information all over the world. But these countries are concerned whether the benefits of the information-technology can be made universally available, given the high cost of setting up national systems, the substantial cost of long-distance access to universal systems through networks, and the rapid obsolescence of much existing equipment. Some developing countries already have acquired on-line links; others have developed their own software for selected applications; but for most of them, new information-technology is a complex area which needs to be approached with prudence.

89. A particular difficulty concerning world access to on-line systems is the complex of legal and economic problems associated with the flow of electronically recorded data across national boundaries. These problems are receiving some international attention and it seems that a number of them are going to be difficult to overcome, notably proprietary rights in data bases, restrictions on imports, transfer of currencies, "common carrier problems", customs duties on international transfer of non-tangible products, variations in access charges and high international telecommunications charges.

90. With the establishment of a New International Economic Order in view, concerted efforts are needed to bring about meaningful and pragmatic international co-operation to overcome these obstacles so that all countries can fully benefit from the advantages of modern information-handling technology to serve their development goals.

PART C

STRATEGIES FOR FUTURE ACTION AT THE NATIONAL, REGIONAL AND INTERNATIONAL LEVELS

I. CHANGE AND CONTINUITY

1. The focus on the numerous requirements of economic and social development, the important progress achieved in information technology and the recognition of the crucial role scientific and technological information plays in socio-economic development are among the factors discussed in Part B which may affect the course of actions undertaken at the national, regional and international levels to ensure a better flow of scientific and technological information and its utilization for the advancement of science and technology and their application to development.

2. When these considerations are coupled with the results of the review of achievements since the UNISIST Conference of 1971, in Part A, new opportunities appear for Unesco to strengthen its programme actions and to develop additional strategies to respond to the needs of Member States.

3. Before the Conference discusses under Chapters II to IX various issues related to strategies for action, it may wish to consider that Unesco's future programme in scientific and technological information should bear the mark of both change and continuity.

The need for continuity

(a) The continuing relevance of the original UNISIST objectives

4. As already indicated in Part A the General Conference launched the UNISIST programme, at its seventeenth session, with the following objectives, as spelled out in 17 C/Resolution 2.131:

"(a) to advance and co-ordinate the world trends towards information-sharing and co-operative agreements among governments, international organizations and operating information services;

(b) to provide guidance and catalytic action for the necessary developments in the field of scientific and technical information;

(c) to facilitate the access of scientists, engineers and technologists to published information;

(d) to help the developing countries meet their needs for scientific and technical information;

(e) to take the necessary measures for the establishment of a flexible world network of information systems and services based on voluntary co-operation". (1)

(1) See 17 C/Resolution 2.131 in, UNESCO. GENERAL CONFERENCE, seventeenth session, Paris, 1972. - Resolutions and recommendations. - Paris : Unesco, 1973. - 218 p. - (Records ; volume 1.)

5. The activities undertaken under UNISIST (1973-1974, 1975-1976) and later as part of the General Information Programme (1977-1978), already reviewed in Part A, correspond with the subobjectives of Objective 10.1 of Unesco's Medium-Term Plan for 1977-1982:(1)

to promote the formulation of information policies and plans (national, regional and global);

to promote the establishment of norms and their dissemination;

to assist in the development of information infrastructure and specialized international information systems;

to promote the training and education of professionals and users of information.

(b) The continuing relevance of the UNISIST framework

6. Unesco, through UNISIST, has provided a conceptual framework for information systems set up at the national, regional and international levels. Its programme activities in this area have been carried out through the co-operation of Member States and in collaboration with other organizations of the United Nations, as well as with other competent governmental and non-governmental international organizations, and sustained by the international communities of scientists, engineers and specialists of the various information professions.

7. This role of stimulator and catalyst of voluntary action has been consistently encouraged by the governing bodies of UNISIST and approved by the General Conference. In rapid review:

- the UNISIST Steering Committee, at its first session (5-9 November 1973) in a resolution recognized "the need for the UNISIST programme to harmonize all relevant information and documentation activities of the United Nations family and to co-ordinate and attempt to integrate, as far as possible, the activities of non-governmental organizations in the same area";(2)

- at its second session (13-17 October 1974), the UNISIST Steering Committee in its resolution reiterated "the need for the UNISIST programme to harmonize all relevant information activities of the United Nations family";(3)

- a resolution of the Intergovernmental Council for the General Information Programme, at its first session (21-25 November 1977) recommended "that Member States should take effective action at the national level, and the Unesco Secretariat at the international level, in order to better harmonize information policy within the United Nations system, and, to this end, invites the Director-General to undertake appropriate studies";(4)

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(1) See Chapter 10 in, Medium-Term Plan (1977-1982). - Paris : Unesco, 1977. - 369 p. - (19 C/4 Approved).

(2) See Resolution 1 A in, UNISIST STEERING COMMITTEE, 1, Paris, 1973. - Final report. - Paris : Unesco, 1974. - 35 p. - (SC/MD/38).

(3) See Resolution 1.5 in, UNISIST STEERING COMMITTEE, 2, Paris, 1975. - Final report. - Paris : Unesco, 1975. - 24 p. - (SC/MD/51).

(4) See Resolution p. 20 in, INTERGOVERNMENTAL COUNCIL FOR THE GENERAL INFORMATION PROGRAMME, 1, Paris, 1977. - Final report. - Paris : Unesco, 1978. - 39 p. - /PGI.77/CONF.201/Col.1/Council 1).

- in establishing the General Information Programme, the General Conference, at its nineteenth session, in 19 C/Resolution 5.1 instructed the Director-General "to take the necessary measures to ensure that the General Information Programme, particularly through the development of projects begun under the UNISIST programme, provides a conceptual framework for information systems devised by the agencies of the United Nations and in particular for Unesco's information activities as a whole".(1)

(c) Continuity in certain priorities

8. - The "UNISIST" Intergovernmental Conference of 1971 recommended that special attention be given to the compatibility of existing and future national, regional and international information systems; and to filling the complex and urgent needs of the developing countries for training and infrastructure.

- At its first session, the UNISIST Steering Committee recommended "to the General Conference that the priorities established by the Intergovernmental Conference of UNISIST of 1971 - namely activities related to systems interconnection and assistance to developing countries, especially in training and education - should be maintained, while noting that many problems in information transfer and information policy including legal and economic problems, are of special importance to some Member States".(2)

- Following the recommendation of the UNISIST Steering Committee, the General Conference, in 18 C/Resolution 2.131 decided that "the priorities of the programme related to systems interconnection and assistance to developing countries, especially in training and education, are maintained while it is recognized that many problems in information transfer and information policy, including legal and economic problems, are of special importance to some Member States".(3)

- The UNISIST Steering Committee at its second session recommended to the General Conference "that the priorities established by the eighteenth General Conference be maintained"; and emphasized "that under each of the UNISIST programme objectives special attention should be given to meeting the needs of the developing countries".(4)

- Then, the General Conference, at its nineteenth session, in its 19 C/Resolution 5.1, authorized the Director-General in the implementation of the General Information Programme to give "particular attention to the needs of the developing countries, especially the problems of transfer of information and data from the technologically advanced countries to the developing nations".(5)

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(1) See 19 C/Resolution 5.1 in, UNESCO. GENERAL CONFERENCE, nineteenth session, 1976. - Resolutions. - Paris : Unesco, 1977. - 182 p. - (Records ; volume 1.)
(2) See Resolution 1 A in, UNISIST STEERING COMMITTEE, 1, Paris, 1973, op. cit.
(3) See 18 C/Resolution 2.131 in, UNESCO. GENERAL CONFERENCE, eighteenth session, Paris, 1974. - Resolutions. - Paris : Unesco, 1975. - 226 p. - (Records ; volume 1.)
(4) See Resolution 1.7 in, UNISIST STEERING COMMITTEE, 2, Paris, 1975, op. cit.
(5) See 19 C/Resolution 5.1 in, UNESCO. GENERAL CONFERENCE, nineteenth session, 1976, op. cit.

- Finally, on the basis of a recommendation from the Intergovernmental Council for the General Information Programme, the General Conference at its twentieth session, in its 20 C/Resolution 5/10.1/1, endorsed "the views of the Intergovernmental Council" and considered "that in the execution of the programme priority should be given to the development of information infrastructures and to the training and education of information personnel and users, special importance being attached to activities for the promotion of information policies and plans and the promotion and dissemination of methods, norms and standards as a prerequisite for successful implementation of the programme as a whole".(1)

New emphases

9. As seen above the continuing relevance of the original UNISIST objectives, the UNISIST framework, and related actions undertaken by Unesco have been reiterated by Member States. The need to maintain momentum in Unesco's programme in this area and to strengthen those actions most relevant to the development preoccupations of Member States emerges from the discussion presented in Parts A and B.

10. The following chapters may serve as a starting point for consideration by the Conference of additional strategies for action at the national, regional and international levels and, possibly, lead it to formulate recommendations on this subject. The suggestions put forward for national action are intended to be merely broadly indicative since the national strategies adopted by each country are obviously devised in the light of its specific national objectives and take into account local, social, cultural, political and other factors.

11. The topics discussed in the following chapters are not exhaustive, but have been selected in part on the basis of the expression of needs by Member States in the debates of Unesco's General Conference and its Executive Board, the UNISIST Steering Committee and the Intergovernmental Council for the General Information Programme. Account has also been taken of the recommendations emanating from the United Nations and its agencies and the preparation of UNCSTD.

12. The topics brought up in the following chapters also follow logically from Parts A and B and reflect an effort by Unesco on the basis of the multiple contacts between the Secretariat and Member States to understand and interpret the present situation of information services in Member States, the challenge to be faced and some of the choices which may determine the future. Because of the continuing relevance of many actions undertaken so far, numerous proposals made represent adjustments to earlier actions rather than wholly new activities. However, the adjustments seem to reveal important trends and emphasize development problems and aspirations of concern to a large section of the international community and of great interest to many Member States.

13. Because these changes represent in many instances new emphases, rather than radical new directions, it has been found necessary to present the issues in some detail in order to indicate their innovative character. If more radical changes in direction have not been proposed, it is because the new ideas or proposals which resulted from the implementation of the programme and the expressed needs of Member States have both been to some extent progressively incorporated into the programme over the last six years, and seemed to follow on the whole the general trends and objectives of programme actions.

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(1) See 20 C/Resolution 5/10.1 in, UNESCO. GENERAL CONFERENCE, twentieth session, Paris, 1978. - Resolutions. - Paris : Unesco, 1979. - 205 p. - Records ; volume 1.)

14. The need for parallel continuity and adjustment of the programme had been recognized by UNISIST from its early days. The words "evolutionary" and "gradual" are found in the original texts. The UNISIST Intergovernmental Conference of 1971 requested the Director-General of Unesco to convene periodically an Intergovernmental Conference to evaluate the past actions and consider future ones. In addition, it recognized the need to limit the scope of the programme at the outset and extend it gradually. In fact, in its resolution, the UNISIST Intergovernmental Conference of 1971 acknowledged that "initially, UNISIST must embrace the fundamental sciences, the applied sciences broadly conceived, technology, and subsequently be extended to the social sciences and humanities as soon as possible".(1)

15. As far as Unesco's programmes and actions at the national, regional and international levels are concerned, the time may be ripe to consider this "extension" to be complete so that the Organization can make its full contribution regarding all matters concerning science and technology and their application to development. In this respect, the essential role of Unesco in connection with the preparation, conduct and follow-up of the UNCSTD was underlined in the Postface to the Draft Adjustments to the Medium-Term Plan (1977-1982) where it is stated that "the act of placing science and technology at the service of development calls for a broad intersectoral interdisciplinary approach unique to Unesco, since in what it does and seeks to do, it is grappling simultaneously with science and technology, education, the social sciences, culture and communication".(2)

ISSUES RELATING TO THE NEED FOR CHANGE AND CONTINUITY IN UNESCO'S STRATEGIES FOR ACTION

In the light of the review of achievements since the "UNISIST" Intergovernmental Conference of 1971 (Part A) and the focus on social and economic trends in the emerging nations, the recognition of the fundamental role scientific and technological information plays in development, the important progress achieved in information technology, and the factors affecting the programme's environment (Part B) the Conference may wish to confirm:

(a) the continuing relevance of the original UNISIST objective for facilitating the flow and utilization of scientific and technological information as laid down in Unesco's Medium-Term Plan for 1977-1982;

(b) the continuing relevance of UNISIST as a conceptual framework for information system and services development at the national, regional and international levels;

(1) See Resolution p. 18 in, INTERGOVERNMENTAL CONFERENCE ON THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM, Paris, 1971. - Final report. - Paris : Unesco, 1971. - 60 p. - (SC/MD/25).

(2) See p. 10 in, UNESCO. GENERAL CONFERENCE, twentieth session, Paris, 1978. - Draft adjustments to the Medium-Term Plan (1977-1982) : Postface. - Paris : Unesco, 1978. - 17 p. - (20 C/4 II).

(c) the continuing validity of the priorities set up in Member States for Unesco's programme in scientific and technological information;

(d) the need for new emphases and adjustments and additional strategies in Unesco's information programme, as well as additional strategies for action at the national, regional and international levels to respond to the development needs of Member States, and contribute to the development of science and technology and their application to development and to the establishment of the New International Economic Order.

II. INFORMATION REQUIREMENTS FOR DEVELOPMENT

16. In recent years there has been a growing awareness of information as a crucial factor in the progress of the industrialized nations whatever their social and economic policies and the degree of institutionalization of communication and information channels; the economic and cultural impacts of information within an industrial society are well documented.

17. On the other hand, information is increasingly seen as a major factor for accelerating the development process of the developing countries which should make a relevant utilization of both the immense fund of already available knowledge and of newly generated knowledge produced locally.

18. The basic problem in successfully applying information to development is the identification of appropriate information requirements. This involves the identification of actual and potential information users, and that of their specific information needs in the light of the country's development goals and objectives.

19. Information users concerned with development fall into three categories:

policy-makers, planners and managers requiring information for decision-making or for determining priority areas for national development. This type of information is required at all levels of government, in business and industry, in research organizations and academic institutions;

trained specialists involved in research, development and their application in all fields. They need information to sustain the innovative process which is required to transform decisions on priorities into productive reality;

much of the rest of the population also requires information for development. For instance, in the developing countries many of those living in rural areas, are in need of information about available technologies yet unknown to them, but which could improve their daily lives. The provision of information to the active population will have a long-term effect on the educational level and consequently on the supply of skilled manpower in the developing countries.

20. It is necessary to determine what types of information and information services are needed for the various kinds of uses and users. Then investigation is needed of how far existing services, including universal services organized abroad, can meet these needs without significant extension or modification. These two sets of data, when matched, indicate the volume of additional effort required to provide

adequate information sources. It is the utilization of information by planners, scientists, engineers, industrialists, educators and labour as they contribute to the overall development effort which is important. Consideration of the needs of such user groups is, therefore, fundamental to an understanding of the role of information in development.

21. These needs vary with the economic and social characteristics of each country, differences in national economic and social policies, priorities among sectoral programmes, and other factors. However, it is possible to present some general characteristics of the information needs of the three major user categories described above.

22. The information required by policy-makers, planners and managers is often of a factual, statistical or normative nature, or involves comparison or analysis concerning development options. Not only current information, but also extrapolations and forecasts for the future, are essential for decision-making. Comparison with relevant historical data may also be necessary. Much data of this type is contained in government records and archives. These are basic sources, too frequently neglected in planning for development.

23. Scientists and technologists also rely increasingly on information services tailored to their specialized needs (dissemination of technical reports, reference data, review journals, information analysis centres, information on research in progress, etc.); reasons for this trend include the increasing cost and complexity and the interdisciplinary nature of research and its application.

24. In scientific research, increased international flow of information and the development of innovative national information services are necessary to enable scientists in developing countries to maintain productivity despite such problems as isolation from the international community, inadequate research resources and educational handicaps. In technological research and application the particular needs of specialists in developing countries are similar but even more critical owing to proprietary rights and other factors posing difficulties in the transfer of information, and the nature of work on the development of new indigenous technologies.

25. Establishing the information communication chain with the remaining sectors often involves the repackaging and the dissemination of appropriate information through the educational system and by means of the mass media as well as through the components of the country's information infrastructure. Particular difficulties are encountered in trying to reach the grass-roots level, especially in the rural areas which often need to be approached through extension and other contact services. Several problems which may be encountered when serving any users group are most frequently met in trying to fill the needs of the population at large:

non-availability of appropriate information;

non-awareness of the existence of appropriate information;

information presented to the contact services for further processing in not-easily understood form and language;

lack of attention to the production, acquisition and processing of extension literature;

linguistic and cultural barriers to communication.

26. Attempts to satisfy information requirements for development may be made only after recognition of the following facts:

all types of users concerned with development increasingly require evaluated, consolidated and repackaged information, appropriate to their individual needs, in addition to readily available facts and documentation;

only active co-operation and frequent contacts between information systems and users groups can ensure the transfer and utilization of information in development. For user needs are not always expressed and the information needed may not be fully available. In addition, needs may evolve rapidly in a changing environment;

in many cases, existing information services can be improved to meet user needs, not only in respect to coverage and rapidity of service but also in suitability of form.

27. Some Member States may find it difficult to deal with these problems because they lack the skilled manpower or because they find it hard to secure reliable data about potentially available information services. Unesco is in a good position to help them, individually or on a regional level to undertake, update and apply the assessments required.

28. The strategy of UNISIST at the national, regional and international levels should be a user-oriented strategy. It is appropriate to continue to lay emphasis on the needs of the world's scientific and technological communities since science and technology, through the use of information, generate new knowledge for development. However, in view of the multifaceted nature of the global development objectives of Member States, new emphasis can also be placed on the satisfaction of the information needs of policy-makers and other categories of users, including the general public which has so much to gain from development.

ISSUES RELATING TO INFORMATION REQUIREMENTS FOR DEVELOPMENT

1. In the light of the growing awareness that scientific and technological information is a major factor for accelerating the development process and the recognition that identification of information requirements is the first step towards successfully applying information to development, the Conference may wish to examine the difficulties encountered by Member States in arriving at a clear understanding of how information can best be applied to serve development and how the information requirements for development can effectively be determined.

2. In discussing actions related to these issues which may be undertaken at the national level, the Conference may wish to consider whether:

first major steps for establishing the national information requirements for development should be based on an identification of development goals, short and medium term; establishment of national programmes of action for their realization should include (a) identification of types of information users, present and future, who can make a contribution to national development and (b) determination of the types of information and information services needed for the various

types of users (as compared to existing services). Appropriate policy decisions and actions should follow to acquire, organize, give access to and utilize scientific and technological information to serve national development plans.

3. The Conference may also wish to consider the strategies and actions to be undertaken at the international and regional levels, related to these issues, and in particular whether:

(a) the strategy in UNISIST should be user-oriented. Continued emphasis should be given to the needs of scientific and technological communities since science and technology, through use of information, produce new knowledge for development. But, in addition, new emphasis should be given to the information needs of all categories of users contributing to development and special attention assigned to the need for evaluated, consolidated and repackaged information, data and documentation;

(b) Unesco should encourage existing and future national, regional and international information systems and services as well as international intergovernmental and non-governmental information programmes and organizations, to be user-oriented;

(c) Unesco should assist Member States, at their request, in determining their national information requirements for development based on national development goals, and should prepare the necessary guidelines and make available the required expertise in order to assist Member States in carrying out the complex tasks described under 2 above.

III. INFORMATION POLICIES AND PROGRAMMES

29. The aim of a national information policy has been defined as "to identify the information requirements of the country and to ensure that they are satisfied as fully, promptly, cheaply and conveniently as scarce resources allow".(1) UNISIST proposals supported such a definition and identified some of the major policy issues. Greater emphasis is needed on how to convert national information policies into the programmes through which they are executed.

30. A national information policy should assign responsibility for assessing user needs; providing information services through appropriate structures including libraries and archives; developing the professional and technical manpower required; educating users and ensuring their active involvement in information transfer; introducing new information technology and stimulating and supporting information research, as necessary. Implementation of such a policy needs planning and co-ordination if it is to result in a balance of scarce resources with competing

(1) See p. 9 in, GRAY (John C.). - Information policy and planning for economic and social development: a dynamic approach. - Paris : Unesco, 1978. - 26 p. - (PGI/UNISIST/WA/1/3).

priorities. In many countries this can be difficult to achieve because information policy responsibilities are decentralized among a number of ministries and agencies. In such countries, co-operation for purposes of planning must be voluntary and should proceed on the basis of a clear allocation of responsibilities and of accountability for performance.

31. The question is how information policies and programmes can best be drawn up, harmonized and financed once it is understood that they are an essential part of national policy for economic and social development and that the policy-making machinery involved should be related to the machinery for development planning. The international and regional meetings sponsored by Unesco could contribute more fully to assisting Member States along these lines.

32. The experience of Member States that have recently successfully faced the problem could be drawn upon. There should be an organized feedback from Member States on the progress made in creating policies and programmes and on the use made of Unesco initiatives as well as on the problems encountered and remaining unsolved. Provision should be made for developing countries to carry out research and experiments in the elaboration and implementation of information policy related to development. Efforts should be made to extend the functions of national focal points for UNISIST to seek a better integration of scientific and technological information for socio-economic development in the general policy planning of governments.

33. Information policy planned within the general framework of socio-economic development should be concerned in particular with the needs of groups already identified in section II:

policy-makers, planners and managers in areas of national development;

specialists involved in research, development and application;

grass-roots level.

34. Policies related to services for the third group are particularly needed as stressed by the Unesco-COSTED Seminar on the Impact of Information Services on National Development (Bangalore, India, 1978)(1) which discussed UNISIST-sponsored surveys on the subject in five developing countries. It recommended the reorientation of national information policy to include responsibility for providing technical support to extension services and for improving the transfer of information to the economically and socially least developed sections of the community. Pilot projects should be considered as a method for developing suitable means for the consolidation and repackaging of information materials for the least developed sectors.

35. In recent years innovative approaches have been made in developing countries to the problems of establishing communication between those conducting research in universities and national laboratories and the actual problems and needs of people in underdeveloped areas. There have been efforts to draw upon the expertise and facilities in these organizations for the solutions of development problems and to facilitate the transfer of technology. These include the establishment of rural

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(1) Technical information services for developing countries: proceedings of a conference, organized by the Committee on Science and Technology in Developing Countries / edited by S. Radhakrishna and T.K.S. Iyengar. - Bangalore : COSTED, 1978. - 344 p.

technology development and transfer centres on university campuses; the "adoption" of villages and districts for special attention by multidisciplinary laboratory complexes; the provision of special incentives for engineers and technologists to work in research laboratories on technology to be used by small businesses and the creation of interdisciplinary research groups on rural technology. These arrangements have also led to the preparation of a variety of information sources and tools such as compilations of institutional profiles and technology profiles.

36. In order to increase the effectiveness of national information systems for development, some policy issues may need attention. When not already provided for:

steps should be taken to devise methods for the effective utilization of the science and technology infrastructure to produce consolidated and repackaged information for use in solving developmental problems;

in order to encourage the scientific community to direct their work into socially relevant areas, emphasis should be placed on the generation of information material on developmental problems for which scientific solutions are not yet fully available;

steps should be taken to identify and remove impediments to the efficient transfer of scientific and technological information;

the national information policy should explicitly support the provision of information to extension services and related activities;

agencies responsible for extension activities should be represented on the national body which advises on information policy and programmes;

provision should be made for the formulation of programmes for the selection, training and evaluation of personnel employed in the process of disseminating scientific and technological information to all sectors of society; considering the importance of person to person contact in information transfer, parents, teachers and government officials working in the rural areas should be recognized as useful agents of information transfer.

37. These suggestions, mostly directed to national planning bodies, correspond with recommendations made by the Intergovernmental Council and Advisory Committee of Unesco's General Information Programme and by the Secretary-General of the United Nations to the General Assembly in his document entitled "Establishment of a Network for the Exchange of Technological Information",(1) which stresses the importance of ensuring an effective information transfer chain at the national level supported by an adequate information infrastructure with appropriate mechanisms for reaching all sectors of the population.

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(1) UNITED NATIONS. Economic and Social Council. - Establishment of a network for the exchange of technological information. - New York : United Nations, 1976. - 22 p. - (E/5839).

ISSUES RELATING TO INFORMATION POLICY, PLANS AND PROGRAMMES

1. Recognizing that information policies and plans constitute an essential and inseparable part of national policy for economic and social development, the Conference may wish to discuss, among other things, how information policies and programmes can best be drawn up, harmonized and implemented to serve the development process.

2. In discussing actions which may be undertaken at the national level, the Conference may wish to consider whether:

(a) in the dynamically changing environment, there is a priority need for recognizing information as a national and international resource for development; its acquisition, handling and effective utilization require the formulation of harmonized national information policy and plans in close association with national development policy in order that these countries be able to: (i) improve the flow and utilization of information within and outside the countries in development-catalysing activities; (ii) strengthen their capability in information system planning and development; and (iii) utilize international assistance resources effectively;

(b) the national information policy should emphasize the importance of having plans and programmes provide for the scientific and technological information needs of the entire society - from the development planning, policy-making, programme implementing groups through the research and development and professional groups in all sectors, to people at large, all of whom are, in one way or another, involved in the development process. Policy and plans should cover the whole range of information infrastructures, the complex of institutions, organizations, resources and systems and services including libraries and archives, which support the flow and delivery of information to satisfy the needs of each individual user;

(c) it is desirable to designate a national information co-ordinating agency (national focal point) where one does not exist. It should be located high in the government structure and assigned responsibility for the harmonized planning, co-ordinating and management of the national information system. The agency would among other things: advise the government on the formulation of the national information policy and its implementation; ensure that the national information policy and plan form an integral part of the national development policy and plan; advise on the constitution of information committees; advise on the criteria, guidelines and standards for planning, development, financing and assessing performance of the components of the information system; establish mechanisms to ensure adequate input to the system in terms of manpower, finance, facilities; advise on and interact with international and regional information programmes and the co-ordination of their activities in the country;

(d) in national information policies, more attention needs to be given, especially in developing countries, to information manpower development as well as to research in the field of information so as to enhance the quality and image of available professional human resources.

3. In discussing strategies and actions at the international and regional levels, the Conference may wish to consider whether:

(a) the UNISIST guidelines on information policy and planning should be closely linked to the relevant aspects of national development planning and enlarged to cover the information requirements of a very broad array of users including policy-makers, planners and managers in areas of national development; specialists involved in research, development and application; and the grass-roots level;

(b) the guidelines should analyse the functions of national focal points and UNISIST national committees and, taking into account the broader scope needed, should explain the structure, location and functions of such agencies and committees;

(c) Unesco should continue to catalyse national and regional information policy development, giving particular attention to the need to associate policy-makers, development planners and information professions. Experiences in Member States in formulating and implementing national information policies and plans, closely related to national socio-economic development plans, should be pooled and diffused;

(d) in providing assistance to Member States, Unesco should ensure that projects for developing individual infrastructure components fit into and contribute to the development of the total national information system, and enhance the national capability in information systems design and operation;

(e) Unesco, in association with other international organizations, may encourage and support the development of networks of corresponding specialists to facilitate the flow of information (e.g. the population information correspondents network of the ESCAP region);

(f) Unesco's information programme should also be conducive to enhancing the image of the information professions and contributive to the development of documentation and library, information and archival sciences;

(g) special efforts should be deployed to explain, diffuse, make available and better known in as many languages as possible the many publications, guidelines, recommendations, methods, norms and standards existing or being prepared relating to UNISIST.

IV. PROMOTING THE EFFECTIVE USE OF INFORMATION

38. Underlying the UNISIST objectives are three major challenges, common to all countries but particularly important to the developing world. They are: how to gain access to information; how to manage information; and how to make effective use of information resources. Reflection on the assessment will suggest that the UNISIST programme has concentrated its efforts mainly on the first two challenges; it has been most active in developing tools for systems interconnection and standardization on the one hand, and with policy formulation, planning and guidelines on the other. While much remains to be done in both these areas, more effort should also be directed to the promotion of effective use of information which is the final goal of the whole "machinery" of information systems, services, networks and programmes.

39. As has already been pointed out, information is over-produced but under-utilized. There is an abundance of accessible supply, yet the COSTED study of the Impact of Information Services for Development (1977)(1) reported that 70 per cent of 240 small industrial firms surveyed in India stated that they had no source of information for technological innovation, and 63 per cent said that they felt no need for information on new technologies.

40. In future programmes, therefore, emphasis should be placed on activities designed to increase the use of existing and newly-created information sources and services, along the following lines:

- improving the use of information by policy-makers, planners and managers (see paragraphs 41-48);
- promoting information use skills (see paragraphs 49-59);
- developing information systems and services which take into account user needs, requirements and information gathering habits (see section V).

Improving the use of information by policy-makers, planners and managers

41. It is frequently observed that development planners, policy-makers and managers may not be sufficiently aware of the place and convinced of the value of information in planning, decision-making, problem-solving, management and other activities in which they may be involved. Some reasons put forward are that a country may lack an educational tradition which fosters the use of information for problem-solving, or that the planners lack successful experience with an information system designed to meet their needs. Whatever the reason, a gap between national economic planning and the provision of scientific and technological information services seems to be one of the main causes of the under-utilization of information.

42. One way of tackling the issue is to produce evidence of ways in which information has contributed to economic development and so create a motivation for the use of information services. It can be pointed out that industrial organizations with good access to information on products, materials, processes, techniques,

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(1) ICSU. COMMITTEE ON SCIENCE AND TECHNOLOGY IN DEVELOPING COUNTRIES. - Impact of information services on national development. - Bangalore : COSTED, 1977. - 81 p.

management methods, standards, quality control, inspection methods, financial sources, industrial relations and potential markets, have frequently:

changed their range of products for a better one;

reduced production costs and/or increased the reliability of the products;

avoided unsuitable processes or techniques;

corrected faults in manufacture;

overcome workers' resistance to innovation;

discovered potentially good markets for their products.

It is also widely recognized that rice and rubber production has greatly increased in several countries since the establishment of research institutes with excellent information services.

43. This does not mean that any information service will necessarily give value for money. Each country has to decide how it should allocate scanty resources for information between one field of development and another, and between those services that it can best provide locally and those that can be obtained more cheaply from other countries. It also has to ensure that services are efficiently run to achieve potential benefits. There is certainly a need to record more systematically than in the past evidence of how use of information has assisted development of various kinds and justified its cost.

44. There are a number of cases, scattered in the literature, of losses incurred for want of timely information, of rewards brought by reliable information available at the right time, and on the opening of new lines of work or other innovations suggested by information about experiences and experiments in other developing countries. It would be useful to collect and compile such case histories for use in information appreciation programmes for managers. Projects could be initiated in developing countries to survey and identify such cases. Such studies could also be built into current and future UNDP projects.

45. The need for making planners, policy-makers and administrators in information more sensitive to this issue has been reiterated, as a greater appreciation by them of the value of information would result in a higher priority for national information systems development. The UNISIST regional meetings on information policy and planning, intended in part to create a dialogue between the development planners and policy-makers on the one hand and information specialists on the other have not always attracted the appropriate government authorities as participants.

46. A closer liaison should bring reciprocal advantages: better understanding by information specialists of development priorities and capabilities, thereby enhancing the selection of appropriate information, and a better understanding of the value of technological information for national planning and programme implementation on the part of the planners.

47. There is also need for more intensive effort on the part of information specialists. These should find as many opportunities as possible to enrol in seminars, symposia and conferences on planning and management, in order to present ideas on information and information systems in general terms as well as on how information services can contribute solutions to the questions and problems under discussion.

A demonstration at a meeting frequently has a good impact. Advance preparation is necessary, however. It is important to talk to "management" in terms they understand, and not in the jargon of information specialists. For example, a practical problem like planning water resources could be divided into steps and the information and information sources helpful at the different stages identified.

48. While seminars and the type of programmes mentioned above are no doubt helpful and provide useful approaches to management's sensitivity to the matter at issue, another possibility is to develop information services specifically for policy-makers, planners and managers to demonstrate the value of information and information systems in their day-to-day activities. Assistance and guidance to Member States in building up information services for development planners, policy-makers and managers and integrating them into national information systems should be emphasized in future Unesco programmes.

Promotion of information-use skills

49. In many respects the issue of user education and training appears as a fundamental one to the problems related to the storage, processing, flow and utilization of information. The most advanced information services are of little value unless users who need information utilize them to their satisfaction.

50. It is generally accepted that present scientific and technological information services are used effectively in most cases by only a small proportion of potential users. This problem acquires its real dimension when one considers the time actually spent by users in trying to locate the information they need. (In some countries engineers and technologists spend over 20 per cent of their time searching for, assembling, evaluating and communicating information.)

51. The total expenditures for communicating scientific and technological information - broadly defined - may be grouped under three headings:

cost of recording results of research and development;

cost of abstracting, indexing, storing information and running systems and services;

cost of time spent by managers, scientists, engineers in communicating information.

52. Surveys show that the largest category is the third. Therefore, any improvement in the effective utilization of information resources and services and better communication of information is of real importance.

53. The usual reasons cited for the under-utilization of scientific and technological information services are lack of familiarity with available resources and insufficient instruction in gaining access to and using services, as well as a lack of motivation on the part of users or disappointment with existing services. Studies of use and non-use of information and information services can affect not only the design of training programmes for users but most importantly the choice of information services to be provided. Therefore, imperfect as they may be, investigations of user needs, information-seeking behaviour, and patterns of use and non-use of information constitute a useful tool for policy-makers, for developing training programmes and for designing appropriate information service.

54. Complementing the identification of needs would be programmes designed to improve the ability to locate and acquire selectively the information needed. The ongoing efforts to improve access to information are related to these, but more might be done to familiarize users and user-representatives with sources of supply. Training courses in gaining access to information systems, in locating specialized information resources, in locating and acquiring documents, patents, trade literature, manufacturers' catalogues, specifications and other sources of technological information are required. Special attention needs to be given to the retraining of librarians and information workers to help end-users get the best out of any information system or service.

55. User education is recognized as an important component of any programme intended to improve information handling and use capability. In fact, the economics of information systems partly rest on the question of how well the systems are used. Therefore, early in its development UNISIST started giving attention to user education, and highlights of relevant actions taken have been mentioned in Part A. A number of countries have invested heavily in various forms of user education and Unesco has tried to distil their experience in a teaching manual and in various seminars. Special emphasis in information programmes on "development" could bring in a wide spectrum of user groups.

56. Here we shall consider as examples:

(a) those who play a link role between the grass-roots level and development programmes, e.g. extension workers, contact farmers, mass media personnel; and

(b) children and youth.

57. In many developing countries there are short- and long-term training courses for extension workers. In many cases such courses form part of training for agriculture, farm management, and rural development. In addition there are courses in development support communications. The introduction of material on information use is required.

58. In most developing countries over 40 per cent of the population is below 15 years of age. The contribution to national development of this great human potential will, in a large measure, depend upon how well they are able to use information in their respective walks of life. This implies the importance of early training in the use of information and information resources. Capability to use information will contribute to appreciation of the value of information and information systems. This is a complex, continuing and gigantic task since in many developing countries there do not yet exist adequate schools for all the nations' children, not to mention school library facilities. Nevertheless, the acceleration of the pace of development depends in part on achievements in this direction. The introduction of information-use training in the education curricula for children and youth would call for a close co-operation between the General Information Programme and the Education Sector. Initial work on this problem is being undertaken in co-operation with IFLA.

59. Such utilization-oriented programmes would not replace UNISIST efforts to assist Member States in organizing national scientific and technological information services, but would enhance the contribution of such services to national development by making them more responsive to development needs.

ISSUES RELATING TO THE EFFECTIVE USE OF INFORMATION

1. In the light of the review presented in this chapter and the experience of Member States, the Conference may wish to discuss ways and means of promoting use of information to contribute to national development, identifying the problems encountered in Member States in utilizing this information effectively and suggesting strategies and activities for national, regional and international action.

A. Use of information by development planners and policy-makers

2. In discussing national level strategies and actions, the Conference may wish to consider the need for Member States to develop programmes to enhance the utilization and appreciation of existing information sources by development planners, policy-makers, programme administrators and other decision-makers. These programmes may include:

(a) the compilation of surveys and case studies to produce firm evidence of the ways in which information has been used to minimize duplication of effort, bring financial rewards from timely information and open up new lines of work and other innovations;

(b) the organization of short appreciation sessions to different planning and programming groups in such fields as agriculture, industry, energy, national and State economic development, accentuating specific problems of interest to individual groups;

(c) the adaptation of existing systems and services and the establishment of new ones to meet the specific needs of development planning and policy-making.

3. In discussing strategies and actions at the international and regional levels, the Conference may wish to consider whether:

Unesco in co-operation with appropriate bodies should initiate, support and provide guidance for (a) surveys and case studies of the type mentioned in 2 (a) in different countries, for (b) the organization and conduct of appreciation sessions including the preparation of materials as mentioned in 2 (b), and for (c) improving information facilities for development planners, policy-makers and managers.

B. Promotion of information-use skill

4. In discussing actions which may be undertaken at the national level to promote information-use skill, the Conference may wish to consider whether:

(a) since present STI systems and services are used by only a small proportion of potential users, including scientists, engineers, educators, technicians, governmental staff and the general public, and since improved information-use capability could greatly

increase efficiency and effectiveness in many areas of endeavour and make a positive contribution to socio-economic development, urgent and large-scale action is necessary to promote information-use education and training, formal and out of school, at various levels and for all classes of STI users;

(b) in view of the fact that in many developing countries over 40 per cent of the population is made up of people below 15 years of age, particular attention is needed to teach this group to become information conscious.

5. In discussing actions related to those issues which may be undertaken at the international and regional levels, the Conference may wish to consider whether:

(a) Unesco, in co-operation with appropriate national and international organizations, could extend its user training programme to develop suitable syllabi, information-use packages and guidelines for conduct of information-use courses for a variety of user groups, paying particular attention to the requirements of personnel involved in extension activities;

(b) Unesco and other organizations concerned with education could pay attention to the need to develop information-use capability in children and young people, and develop appropriate training packages to this end;

(c) whenever Unesco supports development of school library facilities in Member States, the information-use skill development concept could be introduced as an integral part of the effort.

V. IMPROVING ACCESS TO INFORMATION

60. When establishing strategies to improve access to information, the sources and the characteristics of the information needed should be taken into consideration.

61. First, the sources available for meeting the information requirements of development are reached through two main categories of services:

(1) universal services, i.e. information services, provided by national or international organizations, with potential for universal access and of wide geographic coverage;

(2) local services, i.e. services created to deal mainly with local problems of development which draw on regional, national or subnational sources, usually in vernacular languages.

These services are complementary and both are essential to a well-developed national information system.

62. Whether universal or local sources are involved, access should be provided to numerical and factual data, to government records and archives and to bibliographic information, as well as to documents, whatever their form, requested on the

basis of bibliographic information and finally, to consolidated and repackaged information (sometimes called "tertiary information"), tailored to the needs of specific user groups and/or individual users.

Universal services

63. Universal services have most frequently been produced in developed countries and those in the field of science and technology have traditionally been oriented towards research and development though many of them, especially those produced by international organizations, now include material on application as well as on economic and social aspects. International co-operative networks, such as AGRIS, INIS and INFOTERRA (formerly International Referral System) have been instrumental in recent years in providing universal services in key development areas, by ensuring both input from and accessibility to countries at all levels of development.

64. Bibliographic services are the most widely used ones, perhaps even in developing countries, but have been designed for users with easy access to the literature who can handle scientific and technological detail. But services that provide analysis, consolidation and repackaging of information in data compilations, reviews, digests, manuals, etc. are of equal, possibly greater, value to end-users engaged in development and ought, therefore, to receive strong support. The increasing emphasis on international referral networks is timely. Also, services that provide ready access to literature are important, especially in small and developing countries which have limited funds for the acquisition of documents.

Three major aspects of universal services deserve attention:

65. Providing universal access to bibliographic information is not primarily a problem of making the information itself universally available; most information services in developed countries are already available world-wide. It is rather a problem of awareness, speed of communication, overcoming restrictions on the international flow of computer-readable material and costs.

66. To become familiar with the wide range of available services, their scope and terms of service, is a difficult task; it is clear that each developing country needs at least one centre with personnel trained to provide efficient access to world sources of information. Such centres provide the appropriate infrastructure for participation in co-operative international bibliographic information systems such as AGRIS and INIS. These centres are components of national referral networks and links in international referral networks. The on-line information centres created in several developed countries are of particular interest for the future. Assistance to Member States in building up facilities and expertise for access to imported and locally developed data bases should be continued. Regional co-operative programmes should be strengthened. International referral networks and their greater use by developing countries should be promoted and assisted.

67. The slow speed of certain forms of international communication is a serious problem for many developing countries, dependent as they are on long-distance postal services for supply of literature and answers to queries. However, telecommunication links across the world are likely to improve greatly over the next ten years, thus speeding up the flow of information in electronic form. The same developments are likely to reduce costs, in particular those of access to computerized stores of information in remote locations. If this does occur, a developing country can then regard access to these stores either as an extension of its national services or as the main source of information services which the national services will complement.

68. Providing universal access to documents has always been an aim, but was not until recently formulated into a programme. There is a need for an effective world-wide interlending system. This system should contain not only collections of documents, but also the means of locating them, and the mechanisms for transmitting requests and documents. The possibilities, as well as the need, for international co-operation in this field are growing. Co-operation could take various forms including bilateral systems, co-operative regional systems or systems based on one or more large lending collections; multiple solutions could, in fact, be adopted. The programme for Universal Availability of Publications (UAP) of the International Federation of Library Associations and Institutions should be given special consideration in the development of co-operative international efforts in this area. Consideration should eventually be given to the problem of access to the unique documents housed in archives, particularly through the provision of copies.

69. Relevance of universal sources to local development needs. Given that many universal information systems are not well designed for meeting local needs, especially in developing countries, Member States need to determine what parts of universal services are relevant to local needs as well as what relevant information is missing and to consider whether it is best supplied by the extension of existing services or by the creation of new local services. Periodic meetings between representatives of Member States and of leading national and international services could provide a forum for discussion of requirements and difficulties in satisfying them. Studies could be supported to examine the ways in which existing international co-operative networks have modified and extended their plans and operations to meet needs expressed by governments or users.

70. The best approach to ensuring appropriateness and accessibility of universal sources for the developing countries is certainly to increase their interaction with and participation in these sources. The value to developing countries of participating in existing international co-operative networks covering bibliographic information, patent documentation, information referrals, etc. should be stressed as well as the importance of national participation in international non-governmental organizations concerned with the transfer of scientific and technological information, e.g. the ICSU Abstracting Board (ICSU/AB), the ICSU Committee for Data on Science and Technology (CODATA) and the World Federation of Engineering Organizations (WFEO) through its Committee on Engineering Information.

71. An area of particular interest to developing countries is access to universal sources of reliable scientific and technological data, which is necessary not only for scientific research but also for applications such as product/process development and quality control. Increasing consideration of handling and exchange of such data by national information services could provide additional sources for technological development.

Local sources

72. Local sources of information can be of many kinds, but their most important facet is that they tend to be highly specialized and related to specific problems or applications. They include sources of information for local communities, in particular legal, financial, social, medical and technological information. Access to these is usually gained through local services - including a chain of intermediaries between formal information services and end users, such as extension workers and participants in the mass media. In the spirit of the New International Economic Order relevant information generated locally and organized in local services should be made available to the developed countries. But in general, these

services are much less highly developed than universal services, and the imbalance presents a serious problem for developing countries.

Three aspects of these local services deserve attention:

73. Information for decision-making, research and development. The importance of reliable consolidated information at the local level to development and to technology transfer has been documented in Part B and various innovative mechanisms are already being applied to this problem.

74. Development policy-makers require basic information and data relating to existing economic and social conditions and phenomena, including accurate current and forecast statistical parameters. Local sources to serve policy-makers are therefore of crucial interest to national information systems. Unesco is already providing methodological and technical guidance in this field, both through the UNISIST programme and the Office of Statistics. Regional co-operation is also being achieved, notably through co-operative programmes sponsored by the regional Economic Commissions of the United Nations.

75. In mobilizing information for development Member States should make more effective use of the social and economic information contained in governmental records and archives initially organized to serve specific administrative needs. The development of modern records management services ensures that information contained in government records, past and present, is readily available to the administration to help meet current and future needs in every field, including development planning.

76. In many countries, the usefulness of a national data bank or a register of indigenously developed technology is being realized. It is an important node in the science and technology information network. The traditional rural technology could very well become an integral part of such technology information banks. A complementary type of data bank which is very important for control of science and technology development at the local level is the register of research projects in progress. These services are appropriate to the needs of both researchers and policy makers, since they can yield statistical data on existing and future scientific and technological potential. This is again a field which should receive attention in UNISIST, in collaboration with international agencies and organizations including UNIDO and WFEO.

77. Another type of local service receiving increasing attention is the information analysis centre supporting economic and social development activities in such fields as agriculture, health, education and small industry. Although employing similar techniques to those already used for the consolidation of information in specialized fields of scientific research, such centres would also provide information to extension workers and other groups directly applying technological information in development. The necessity for co-ordinating such information analysis and consolidation services through national information focal points is obvious. The area of commodities - e.g. rubber, tea, coconut - is considered to be one where information consolidation units could play a major role. A number of countries in the same region could use the products of a particular information consolidation unit.

78. Information transfer systems and programmes for small businessmen, farmers and others in rural areas. The approach to serving these groups is generally quite different from that designed for research workers and policy-makers. Various traditional as well as innovative methods are now used in developing countries for the transfer of scientific and technological information to rural areas. Mentioned earlier were some of the information-communication factors that have been found to encourage successful rural development planning. Attention is now drawn to the importance of personal contacts, the use of mass media, the improvement of communication between the grass-roots level and development planners and the recording, storage and use of information on indigenous traditions.

79. It has long been recognized that in dealing with rural populations the use of individuals either from, or at least thoroughly acquainted with the locality, tends to produce a better response, especially when the contact is supported with practical demonstrations or audio-visual presentations in the language of the community. Individuals making these contacts should be backed by good scientific and technological advisory sources which can draw on local resources, capabilities and technology.

80. The use of mass media for demonstrating and communicating scientific, technical and other development-related information to rural audiences has been growing in developing countries. Regular information broadcasts, discussion groups, demonstrations of experiments and popular lectures have proved to be both informative and educative. Appropriate units of Unesco as well as other agencies and organizations could usefully support additional studies on the kind of support information services could provide to local mass media for treating rural development topics as well as studies on the barriers that may exist to information access and utilization through such means.

81. The need for communication between the grass-roots level and development planners has already been emphasized. But the usual official channels of communication are not always effective. The use of simple recording equipment such as cassette tape recorders which rural people can operate themselves to record free discussions and statements about local problems, practices and solutions for subsequent playing to planners and administrators has proved effective and economical. Studies could be undertaken to identify other innovative use of simple technology to improve information transfer between decision centres and those affected by the decisions, especially in rural areas.

82. The need for respecting local traditional techniques and practices in rural development projects has already been pointed out. Information on indigenous traditions helps relate imported technology and national research programmes to what rural areas need. However, the capture of information on traditional practices is not easy, especially in oral cultures. Much of it has not been recorded in written forms. It has been observed that even in small enterprises innovations are occasionally developed, but those responsible are usually unable to record and disseminate information on them. Therefore, a deliberate national policy and effort are necessary to record details of traditional knowledge and practice.

83. In order to effectively help the lay public, whether or not directly involved in work for development, support to consumer information services should receive more attention.

84. It should be noted that this broad approach to information problems has been supported by the Intergovernmental Council of the General Information Programme and has been echoed in the views of many countries expressed in the preparation for the United Nations Conference on Science and Technology for Development.

85. Promotion of the accessibility of documents is an important means of reinforcing local sources both in developing and developed countries. In order to achieve this, the first requirement is that everyone has access to a library. The system of public and school libraries should, therefore, be further developed and existing libraries improved. The public libraries in developing countries should play an active role in the community, providing facilities, not only for reading and study, but also for exhibitions, displays, film shows, lectures, and adult classes, thus contributing directly to the economic, social and cultural development of the population. Technical considerations of efficiency and economy generally call for the organization of library services from urban centres, which can act as distributing centres for books and bases for the supervisory staff needed to develop libraries in the surrounding area. Social and political considerations, such as the need to arrest the population drift to urban areas may make it wise to provide rural library services at an early stage of development.

86. In order to ensure the optimum use of available resources, the co-ordination of all components of the national information infrastructure is essential. Efforts should be made to promote effective co-operation between all types of libraries, archives, documentation and information services. Questions to be examined include the kinds of local services which can best complement those that are universally available together with the problem of their financing, especially if they call for the expensive processes of analysis and repackaging. Pooling and sharing the experiences of individual countries in setting up local services could be promoted through international problem-oriented seminars, discussions and bilateral exchanges.

ISSUES RELATING TO IMPROVING ACCESS TO INFORMATION

With a view to ensuring access by Member States to scientific and technological information needed to contribute to the development of science and technology and their application to socio-economic development, the Conference may wish to examine ways and means to improving such access by discussing the many issues raised under the following headings: A. Universal information services; B. Information and transfer of technology; C. Local information services and endogenous development; D. Experimental data, data centres, information analysis centres and critical reviews; E. Development planning data and information; and F. Scientific and technological information transfer to and from grass-roots level. In discussing strategies and actions at the national, regional and international levels, under each one of these headings, the Conference may wish to consider the following statements and proposals:

A. Universal information services

1. Implications at the national level

(a) Member States need easy and timely access to universal as well as local sources of scientific and technological information to serve their socio-economic development plans. Access to government records and archives, bibliographic information, data, documents and consolidated and repackaged information should be ensured.

(b) To provide access to universal sources of scientific and technological information, Member States should set up one or more referral centres, with trained personnel, to organize, develop and manage a national referral network and provide a link with international referral networks and international information systems.

2. Implications at the international and regional levels

Unesco, in the framework of UNISIST, should:

(a) assist Member States gain better access to universal sources of scientific and technological information by taking steps to:

(i) increase awareness of existing international sources of information;

(ii) overcome problems of international flow and communication of information;

(iii) diminish restrictions on the international flow of computer-readable material; and

(iv) study with developing countries and producers of scientific and technological information sources, the problems related to cost and time;

(b) in close collaboration with IFLA, continue to assist in developing the Universal Availability of Publications (UAP) and encourage the development of related co-operative international efforts in this area;

(c) encourage and facilitate the effective participation of the developing countries in international co-operative information services and in the management of international information services in order to increase their relevance to the development problems of the international community;

(d) make a concentrated effort to give guidance, prepare appropriate material and guidelines, assist Member States to organize their referral networks at the national or regional levels and help them in the training of qualified manpower for this function;

(e) continue its harmonization efforts to ensure effective bibliographic control for both the library and information and documentation communities.

B. Information and transfer of technology

3. At the national level

Technology assessment, transfer and adaptation is a key factor in achieving national development objectives. Appropriate steps should be taken to provide the national machinery in charge of technology development and transfer(1) with the information which will facilitate the selection, transfer and adaptation of imported technology to the development goals and the social, economic and cultural life of the country. Information is needed on alternative sources of technology, data on similar national and foreign transactions and relevant legislation and practices, nominal costs of technology transfer transactions (payment for the right to use patents, know-how, trademarks, etc.) as well as the real costs of those transactions (technical assistance, price of raw material, return on investment, management, etc.).

4. At the international and regional levels

Unesco, within the framework of UNISIST, should collaborate closely with Member States, international and regional organizations and in particular with the agencies of the United Nations family to assist developing countries establish appropriate information mechanisms to deal with the transfer of technology; these could include national or regional data banks of transfer and development of technology, information services on alternative sources of technology and patent information services.

C. Local information services and endogenous development

5. At the national level

(a) Endogenous development capability being a prerequisite to achievement of self-reliance, it is essential that information systems and services not merely facilitate information flow within and from outside the country, but also sustain and promote endogenous development and the capacity to innovate. National institutions and services in the field of science and technology which provide the setting for endogenous development should be supported by information systems and services which maximize the use of local information resources, stimulate the demand for locally generated knowledge, identify indigenous resources, know-how and capabilities and provide registers of indigenously developed technology as well as registers of research and development projects in progress.

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(1) UNITED NATIONS. General Assembly. - Preparatory Committee for the United Nations Conference on Science and Technology for Development, 3rd session, New York, 1979. - Preliminary draft programme of action : note by the Secretary-General of the Conference. - New York: United Nations, 1979. - (A/CONF.81/PC.28.)
(PGI/UNISIST II/REF.2)

(b) Member States should make effective use of existing social and economic information contained in the administrative and programme records of national and local governments. The establishment and support of modern records management and archival services will assure that statistical and quantitative data obtained in government records past and present, will be readily available to planners, decision-makers and the administrations in meeting both current and future needs in planning and implementing development programmes.

6. At the international and regional levels

(a) Unesco should study and analyse, in collaboration with some developing countries the way in which information systems and services have successfully supported and enhanced endogenous development and should make the evaluated results available to all Member States. Relevant guidelines should be prepared in due time.

(b) Unesco's programme for records management and archival development (RAMP), which is intended to assist Member States in developing modern information services encompassing government records and archives, should be given particular emphasis because of the direct contribution it can make to development.

D. Experimental data, data centres, information analysis centres and critical reviews

7. At the national level

In view of the importance of reliable experimental and observational data in problem-solving, computation and scientific research and the fact that data in some subject fields may be generated in a number of scattered institutions and research groups, such data have to be collected, evaluated and compiled for easy use within the country and in regional or international data banks. It is therefore essential that more concerted efforts be made to:

(a) identify specific areas of interest (to each country) in which data evaluation and compilation and development of data centres and information analysis centres are necessary;

(b) train scientists (including social scientists and economists) specialized in the subject areas concerned, in data evaluation and compilation;

(c) organize data evaluation and compilation groups in appropriate national centres of excellence in the relevant subject fields;

(d) make available internationally the products and facilities of the centres based on an appropriate pricing policy.

8. At the international and regional levels

Unesco, in the framework of UNISIST, should:

(a) in association with ICSU/CODATA, WFEO and other appropriate bodies, support and organize more frequently than in the past, short national and regional training courses, in data generation, selection, evaluation, compilation and distribution, and on data centres development and management as well as on information consolidation and repackaging, development of information analysis centres and services that provide critical reviews and literature surveys;

(b) in association with appropriate international and regional bodies (ICSU, WFEO, International Social Science Development Council, etc.) organize short courses for specialists in the preparation of critical reviews of various types, in recognition of the fact that critical reviews of the state-of-the-art and trends in subjects of specific interest to a country or region are becoming increasingly important, especially in interdisciplinary areas due to the burgeoning of information and complexity of the fields;

(c) in association with appropriate bodies, prepare guidelines, manuals and teaching kits for use in courses of the type mentioned in (a) and (b);

(d) in association with appropriate international and regional organizations, assist and guide in the establishment of data centres and information analysis centres and the promotion of intra-regional co-operation in developing product-oriented data centres.

E. Development planning data and information

9. At the national level

Recognizing the importance of easy and prompt access to statistical, plan and forecast data and information on a variety of economic, social, cultural, regulatory and other questions to facilitate decision-making and effective planning for development, it is essential that adequate attention be given:

(a) to identifying and profiling sources of generation and flow of relevant data and information in the various sectors of government, in research, development and academic institutions and in private organizations within the country as well as relevant information located in other countries and in international and regional organizations;

(b) to organizing and processing data and information (reports, memoranda data sheets, computer output, etc.), when feasible, in centralized archives or information centres for easy access and use;

(c) to establishing appropriate linkages, collaboration and information and data flow among these organizations;

(d) to ensuring compatibility in the information processes and products of the different organizations through the adoption and use of nationally and internationally approved standards and norms;

(e) to training information specialists in such tasks;

(f) to developing appropriate management information systems, as part of modern records management and archival services.

10. At the international and regional levels

Unesco, within the framework of UNISIST and in association with other organizations, could assist Member States in the actions mentioned in 9 by (a) providing experts to advise on the means, methods and procedures to be adopted; (b) by developing norms, standards and guidelines appropriate for the purposes, when these do not already exist; (c) by organizing short courses and workshops on specialized information handling tasks; (d) by organizing short appreciation courses for the officials of the organizations concerned on the need for the facilitation of data and information capture, organization and flow. Programmes for 9 (c), (d) and (e) can be implemented on a regional basis wherever viable and advantageous.

F. Scientific and technological information transfer to and from grass-roots level

11. At the national level

(a) In view of the important role of extension and allied contact services personnel as well as the mass media in communication and transfer of STI information between development programmes management and people at the grass-roots level as well as among the people at the grass-roots level, the Member States should make their national information systems responsible for:

(i) providing consolidated and repackaged scientific and technological information material;

(ii) making scientific and technological information sources and facilities accessible to extension services personnel and the mass media;

(iii) identifying, collecting, recording and disseminating information on traditional indigenous know-how;

(iv) identifying information needs of people at the grass-roots level;

(v) providing information-use education to personnel involved in extension and allied services and the mass media;

(vi) providing information on current development plans and projects to extension services personnel, and the mass media for wider dissemination.

(b) Appropriate agencies, such as government bureaux for extension services and mass media should:

(i) study the existing flow and utilization of scientific and technological information by extension personnel and mass media with a view to identifying problems and bottlenecks;

(ii) compile outlines of courses in extension services, technology transfer and development support communication including mass media with a view to introducing appropriate information-use topics into them.

12. At the international and regional levels

Unesco, within the framework of UNISIST, in collaboration with appropriate national and international agencies should (a) prepare guidelines to assist national efforts on items 11 (a) and (b) above; (b) assist in conducting surveys mentioned under 11 (b); and (c) support the preparation of teaching packages and guidelines for the training of extension services and development communication personnel.

VI. UTILIZATION OF MODERN INFORMATION TECHNOLOGY

87. Recent developments in and extensive utilization of information, telecommunication and reprography technologies have taken place mainly in the technologically advanced countries. Their spread in the developing countries has been slow, and by and large, countries remote from Europe, North America and Japan will benefit significantly only when satellite communication links become plentiful and cheap, or when new mass storage devices, allied to minicomputers, allow the provision of on-line services locally or regionally for small-scale use at a reasonable cost. However, with the increasing needs and demands and the development of information support systems in the developing countries there is also a growing potential for the application of information technology. Use of the accumulated experience in the field could facilitate a rapid pace of progress. It appears desirable and necessary to promote and support more programmes and projects to create better awareness of the advantages and potentialities of information technology in developing environments.

88. A greater awareness of the potential implication of informatics and of the methods for its exploitation in Member States has resulted from the Intergovernmental Conference on Strategies and Policies for Informatics (SPIN) (1978)(1)

(1) INTERGOVERNMENTAL CONFERENCE ON STRATEGIES AND POLICIES FOR INFORMATICS, Torremolinos, Spain, 1978. - Draft final report. - Paris : Unesco; Rome : Intergovernmental Bureau for Informatics, 1978. - 44 p. - (UNESCO/SC-78/SPIN.4 prov.) (IBI/SPIN/6R.4 prov.)

An advisory group of experts from developing and developed countries will be constituted during 1979 with a view to advising the Director-General on new modalities for Unesco's programme in informatics.

89. The present Unesco experiments with both batch and on-line systems (Argentina, India, Nigeria) can be extended to cover all major regions and subregions. Not only scientists and technologists but also development planners, policy-makers and representatives of other user groups from countries in the region should see the demonstrations. These have been known to stimulate the interest of planners and managers in information systems and thereby induce them to support information infrastructure development. Measures should be taken to hasten and facilitate the improvement of telecommunication links in association with bodies such as the International Telecommunication Union, to assist in the development of local telecommunication links, and to study the technical and economic problems of extending modern links world-wide. Assuming that on-line services can be provided cheaply to developing countries, assistance and guidance should be given to users of terminals in newly linked countries on the effective use of the retrieval systems.

90. In those countries where the viability of the large-scale application of computer and telecommunication technologies can be ascertained, international assistance could aid in establishing the facilities required. The experience gained in applying these technologies should be recorded and exchanged.

91. The information technology community is a complex one made up of the following: user groups; hardware producers and distributors; software producers and distributors; qualified manpower in computer and telecommunication applications and in information systems design and operation. The agencies and their interests and concerns are, in many countries, spread in different sectors. Therefore, it may be necessary that the national information policy assign responsibilities to a number of national agencies for the development, provision and utilization of hardware, software and manpower.

92. National information policy on various aspects of information technology applications should be specific, taking into consideration the country's needs, technology development level and its social, cultural, political and economic conditions; it should cover such facets as: minimum viability conditions for information technology applications; priority application areas; interfacing, compatibility, and standardization; information and communication technologies manpower requirements and development; acquisition and development of software; acquisition of foreign data bases and development of national data bases; promotion of R & D in information technology; provision of subsidies for feasibility studies, pilot projects, and initial installation; pricing of services; co-operation and arrangements with appropriate agencies and organizations at the national, regional and international levels.

93. In addition to the general policy on information technology incorporated into the national information policy, detailed guidelines are necessary in specific areas, such as:

- criteria for establishing priorities for information technology applications in library and information systems in relation to needs, trends, and resources, as well as the social, political, economic and technological environment of the country;

- manpower forecasting and educational programmes in information technology;

- user education for different categories of users of information technology;
- selection of hardware and software for specific applications, including those offered by manufacturers and systems designers;
- standards and norms to be used for systems interconnection and for securing compatibility, as far as possible, at the national, regional and international levels;
- telecommunication needs and the development of appropriate facilities in the light of national policies and law regarding telecommunication systems.

94. Concerning the adoption of standards in this area by developing countries, existing norms, standards and guidelines would be helpful, and additional ones would be needed. In formulating norms and standards the special problems of developing countries such as multiple local scripts, language usages and name designations should be taken into account. Also, some standards and guidelines should be simplified and indications given of items for optional use in particular contexts.

95. In some developing countries the use of Electronic Data Processing (EDP) has been spreading in academic and research institutes, government offices and business and industry. Librarians, documentalists, archivists and other information personnel of these organizations have been utilizing the facilities in developing library, archival and other information applications, and a number of interesting local developments could be augmented with minicomputer facilities and appropriate software.

96. Some information of interest to a particular organization may not be included in data bases produced elsewhere: e.g. data and information of a confidential nature, information on ongoing projects not reported outside the organization, etc. Current awareness services, SDI, etc. are produced using the local data base. These developments emphasize the need to incorporate more instruction about information technologies in the librarianship and information courses in the developing countries.

97. One of the problems related to the flow and utilization of information in developing countries is obtaining access to original documents. Interlibrary lending of materials has been increasing, but it has its disadvantages. The difficulties could be mitigated by augmenting the reprography facilities. The use of documents such as periodical articles in any library increases with the provision of reprography. At present most reprographic equipment has to be imported and is usually expensive. In its infrastructure development programme, Unesco should give more attention and support to increasing reprographic facilities in developing countries.

98. Further considerations are the advantages of applying reprography to the management of records (archives), in collection building and publication.

99. National and international mechanisms are required for the periodic collection of data on information technology applications, including hardware and software specifications, types and extent of utilization, users service costs, manpower employed, pricing of services, feedback mechanisms, user training, etc. Such data would be useful in planning information technology application, making comparative studies within and between countries, and in the exchange of ideas and experiences.

ISSUES RELATING TO USE OF INFORMATION TECHNOLOGY

1. In the light of the growing potential for the application of advanced information and communication technology to develop useful and versatile information systems and services and in view of the increased needs and demands for such systems and services, the Conference may wish to examine ways and means to create better awareness of the advantages and potentialities of information and communication technology in developing environments and suggest strategies and actions which may assist Member States in selecting and applying this technology to the development of national information systems adapted to the social, economic and cultural life of each country and responding to its needs.

2. In discussing actions related to these issues which may be undertaken at the national level, the Conference may wish to consider whether:

experience has shown that if carefully chosen and applied, information and communication technologies can facilitate access to and utilization of information in developing countries. Member States should formulate appropriate national policies and plans for the introduction of information technology and build up necessary infrastructures for its effective utilization.

3. The Conference may wish to discuss appropriate actions to be undertaken at the international and regional levels and in particular it may wish to consider whether:

(a) in association with appropriate organizations, Unesco should continue to support and organize in developing countries and regions demonstrations of the application of information and communication technologies; where a level of interest and viability are perceived, further assistance and guidance should be given to install facilities, manpower training and initiate operations that can benefit the country as a whole and where possible, neighbouring countries as well. The experience should be carefully evaluated and the results shared among Member States;

(b) in assisting Member States to build their infrastructures and introduce modern information technology, greater effort should be made internationally to adapt and use the guidelines, tools, methods, norms and standards developed under UNISIST in order to build in the national information systems the compatibility which will allow more effective exchange of STI at the national, regional and international levels;

(c) advisory missions and technical assistance programmes carried out in response to requests for introducing information technology or otherwise improving information infrastructures should be evaluated. Follow-up actions should receive more attention, and these activities should constitute a feedback mechanism to reflect in future projects carried out under UNISIST the needs and requirements of Member States;

(d) international action is needed to set up appropriate mechanisms for the periodic collection and evaluation of data on information technology applications, including hardware and software specifications, and their adaptation to the solution of information problems, especially in developing countries;

(e) guidelines should be developed by Unesco in collaboration with appropriate organizations on the application of information technology in library and information systems; the guidelines should indicate the factors to be taken into account in (i) determining viability and priority areas of application of information technology in different environmental conditions; (ii) selecting hardware and software and developing local software; (iii) selecting norms and standards and the adaptation of existing ones for special situations relating to scripts, languages, name designations, bibliographical descriptions, etc.; (iv) developing interfacing mechanisms; (v) organizing relevant training programmes for systems design, operating staff and users;

(f) in association with Member States and non-governmental organizations, such as FID, IFLA and ISO, Unesco should organize a sustained campaign to promote the wide utilization of norms and standards which will facilitate the flow of information and the rational utilization of information technology. In addition, the suitability of UNISIST guidelines and tools for system interconnection for the developing countries should be explored and the means for rendering them adaptable to a variety of local conditions should be investigated. Attention should be given to the preparation of simpler and more practical application guidelines to norms and standards;

(g) UNISIST activities in training and education of information specialists and users should pay increased attention to (a) educational programmes in information technology, including guidelines, norms and standards; (b) user training in the utilization of modern information technology; and (c) manpower forecasting in relation to the introduction of telecommunication, computers, reprography and other information-related technology;

(h) Unesco in the framework of the UNISIST programme should sponsor the preparation of comprehensive, easy to read publications for large-scale diffusion among policy-makers and planners to explain in non-technical terms the wide range of modern information technology available, and the need for standards, methods and normalized tools for building modern and effective information systems and networks at the service of development.

VII. OBSTACLES TO THE FLOW OF INFORMATION

100. A full list of what could be considered obstacles to the flow of information would include a number which have already been treated in different contexts:

- absence of an information policy integrated in the planning machinery of the country;

- weakness of existing national information infrastructures;

- shortcomings and incompatibilities in the methods and techniques of information processing.

There remains several areas which need exploration.

Legal and administrative obstacles

101. This is a complex of several issues of which the most important are restrictions on availability of confidential information and copyright restrictions on the photocopying of documents. Declassification and publication of documents that were originally confidential has not proved to be a serious problem, so far as government sources are concerned, in those countries that have tackled it systematically; but a large number of countries have still to do so. Support should be given to wider development and the acceleration of programmes for the liberalization of access to archive and to government records. Dealing with industrial (i.e. commercial-in-confidence) sources is much more difficult and hardly any country has set up an effective machinery for this purpose. But information of this kind is vital to technology transfer and to other aspects of development, and it is unclear how far, and with what difficulties, it can be declassified and made available.

102. The copyright problem is extremely complicated because different countries have different laws and these laws can be difficult to understand. It is unlikely that intergovernmental action will quickly harmonize the laws, or the practices evolved under them. However, certain principles emerge from the mixture of practices which, though by no means universally accepted, are sufficiently respected to render them useful for discussion. For example, it is widely agreed that multiple copying is a much more serious problem than single copying; that there is good sense in requiring users to declare that even a single copy is required for study only; and that royalties on use provide one possible solution to publishers' complaints about mass photocopying, but are costly to collect and can reduce access to literature for those unable to pay them. International organizations can help with this difficult problem by promoting study of the ways in which various copyright laws operate and of the practices that command respect and appear to work satisfactorily. This could help to ensure that future changes and modifications of national laws are made on the basis of sound information. It could also be useful for Unesco to assess the likely impact on copyright of word-processing techniques and of electronic publications, which may so develop as to create disputes about the ownership of copyright in certain documents. Such an assessment would seem to be a prerequisite for any future thinking about changes in copyright law.

Economic constraints

103. In many countries, the high cost of providing information, especially in analysed and repackaged form, deters national institutions from providing or buying the services that are needed and users from employing the services that are supplied. There seem to be three main ways of reducing costs: to reduce telecommunication costs; to introduce new technology to local information services, when appropriate; and to persuade countries with similar information requirements to co-operate on the provision of local information services.

104. A number of important questions, therefore, arise in relation to Unesco's activities. What help can be given to Member States trying to assess whether, or in what circumstances, computerization of local information services or of library housekeeping records can reduce costs? How best can interest in regional co-operation

on service development be stimulated? How far have intergovernmental systems such as IRRD, CAB, INIS and AGRIS reduced costs in individual countries? Similarly what effects on costs have resulted from ICSU/CODATA's attempts to secure a rational approach to the compilation of scientific data, and could similar efforts be usefully encouraged in relation to other analysis and repackaging services?

105. Another way of tackling the economic constraints is through pricing policy, which can affect unit costs in so far as it stimulates or depresses demand and which can permit temporary or permanent subsidies in order to encourage the use of services. The traditional approach to pricing policy is somewhat inconsistent in that access to publicly funded libraries is expected to be "free", apart from photocopying; but access to publicly funded information services normally has to be paid for. Many countries recognize the need for subsidies, however, though their extent and the conditions governing them may vary widely.

106. It might be profitable to study, in a Unesco setting, the ways in which different institutions in different countries relate pricing policies to cost and use, in order to draw helpful conclusions for other institutions that seek guidance. It might be possible to produce guidelines on the use of subsidies that will help national information policy-makers determine when public funds should be used for subsidies. It should also be examined whether it is more realistic to relate cost to economic and social benefit rather than to demand at a given price and, if so, is it possible to devise realistic measures of benefit in relation to economic and social development?

107. Restrictions on international flow of computer-readable material are becoming a major concern and have been recently discussed by an OECD Working Party.(1) In many countries the postal and telecommunications authorities (PTTs), are established by law as common carriers and cannot allow a foreign network operator to provide access in their own countries to data bases supplied by third parties. In Europe this problem has been resolved by the PTTs themselves supplying services from the data bases under contractual arrangements with the national and international network operators concerned. But other problems are more difficult to handle. In few major countries is the law of copyright on data bases and software clear; this is something which should be carefully studied: are the arrangements for national rights in intergovernmental information systems (INIS, AGRIS, etc.) satisfactory in an online age? Commercial restrictions derive from the policies of individual countries: there is a case for preparing guidelines or even a model code of practice which Member States could be urged to study closely and to follow as far as possible. The problem of variations in access charges is probably best tackled through discussions with data base producers and network operators, possibly with guidelines drawn from experience - especially that of EURONET, where services are to be provided on equal terms to all members of the EEC and possibly, in due course, to other participating countries. Finally, the problem of high telecommunication costs is best examined with CCITT against a background of likely developments in satellite and other technologies and in the light of the EURONET decision to make telecommunications charges within the EEC countries independent of distance.

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(1) SYMPOSIUM ON TRANSBORDER DATA FLOWS AND THE PROTECTION OF PRIVACY : TRENDS AND IMPACT, Vienna, 1977. - Final report. - Paris : OECD, 1979 (in press).

Linguistic barriers and technical jargon

108. While science is universal, a substantial percentage of scientific and technological information is transmitted in various languages which are not equally represented throughout the world. There can be no doubt that research should be continued on automatic translation, which for the time being, helps, at most, to achieve a better selection of information during the stage of documentary research. It would appear that, before having recourse to translation services, an effort should be made to ensure better distribution of existing translations through centres for the exchange and loan of non-published translations, such as the International Translation Centre at Delft (Netherlands).

109. The increasing specialization of scientific research has led to the development of technical jargon which hampers understanding even among specialists when they have to face up to multidisciplinary problems. For communication to many audiences STI has to be converted into ordinary language.

110. In conclusion, reference is made to the Interim Report of the International Commission for the Study of Communication Problems (20 C/94) submitted to the twentieth session of the General Conference where in the discussion on "Information in the service of science and technology" it is observed, "Might it not be contended that there can be no coherent and acceptable answers to the question of the function of science and technology transfer in national development and its adjustment to meet world needs if the spirit of systematic competition which still underlies national and international relations is not replaced by a new spirit of co-operation based on recognition of the interdependence of each and everyone in the field of knowledge - which itself should increasingly be looked upon as the common property of the international community?".(1)

ISSUES RELATING TO OBSTACLES OF INFORMATION FLOW

1. With regard to legal, administrative, economic and linguistic obstacles to the flow of information, the Conference may provide an opportunity for sharing experiences among Member States on ways to minimize these obstacles and indicate measures which could be taken through existing national, regional and international mechanisms to gradually solve these problems.

2. In discussing national level strategies and actions, the Conference may wish to address recommendations to Member States to give their full attention to elucidating the obstacles to the flow of scientific and technological information within the country and with other countries and take the necessary measures to minimize these obstacles.

3. Regarding actions at the international and regional levels, the Conference may wish to consider whether:

(1) UNESCO. GENERAL CONFERENCE, twentieth session, Paris, 1978. - Interim report of the International Commission for the Study of Communication Problems. - Paris : Unesco, 1978. - 79 p. - (20 C/94).

(a) since confidentiality of information, copyright restrictions and pricing of services are as they are perceived from one angle among the administrative, legal and economic constraints to STI flow and utilization, Unesco, in association with appropriate agencies, should contribute to the examination in depth of the several issues involved, and collect and disseminate information on the different approaches and practices adopted in and among different countries. Such studies should include an investigation of policies and practices regarding access to government records and archives. In due course, guidelines on generally acceptable common practices might be drawn up;

(b) in association with governmental and non-governmental agencies at the national and international levels, Unesco should assist Member States in minimizing the legal, administrative and economic constraints to access and utilization of STI within a country and between countries;

(c) in addition to its catalytic role and specific programme action to facilitate the international flow of STI, it is desirable that Unesco prepare periodically a global state-of-the-art and trend report of the information scenario in all its aspects, at the national, regional and international levels, highlighting the new influences, developments, obstacles and problems - as a service to all those concerned with information transfer in science and technology and their application to development.

VIII. CO-OPERATION AMONG COUNTRIES

111. Attention has been drawn earlier to regional actions under appropriate issues. Regional co-operation constitutes a strategy which should be strengthened in further UNISIST programmes.

112. The emergence of economic-political groupings of countries such as the Council for Mutual Economic Assistance (CMEA), the European Economic Community (EEC) and the Association of South-East Asian Nations (ASEAN); to name only a few often provides the necessary framework for effective regional co-operation.

113. Regional co-operation is increasingly seen as a necessity for survival and development. In this context, although technical co-operation among developing countries (TCDC) is not a new concept, it has received, in recent years, considerable emphasis as a viable means of sharing resources, experiences, expertise, technology, etc. in development activities. The United Nations Conference on Technical Co-operation among Developing Countries (Buenos Aires, September 1978), delineated the TCDC objectives as follows:

"15. The basic objectives of TCDC, which are interdependent and mutually supportive, contribute to the wider objectives of the development of the developing countries and international development co-operation. They reinforce those of closely related forms of co-operation, including economic co-operation among developing countries, for which TCDC is a key instrument. The objectives are:

(a) to foster the self-reliance of developing countries through the enhancement of their creative capacity to find solutions to their development problems in keeping with their own aspirations, values and special needs;

(b) to promote and strengthen collective self-reliance among developing countries through exchanges of experience, the pooling, sharing and utilization of their technical resources, and the development of their complementary capacities;

(c) to strengthen the capacity of developing countries to identify and analyse together the main issues of their development and to formulate the requisite strategies in the conduct of their international economic relations, through pooling of knowledge available in those countries through joint studies by their existing institutions, with a view to establishing the New International Economic Order;

(d) to increase the quantum and enhance the quality of international co-operation as well as to improve the effectiveness of the resources devoted to overall technical co-operation through the pooling of capacities;

(e) to strengthen existing technological capacities in the developing countries, including the traditional sector, to improve the effectiveness with which such capacities are used and to create new capacities and capabilities and in this context to promote the transfer of technology and skills appropriate to their resource endowments and the development potential of the developing countries so as to strengthen their individual and collective self-reliance;

(f) to increase and improve communications among developing countries, leading to a greater awareness of common problems and wider access to available knowledge and experience as well as the creation of new knowledge in tackling problems of development;

(g) to improve the capacity of developing countries for the absorption and adaptation of technology and skill to meet their specific developmental needs;

(h) to recognize and respond to the problems and requirements of the least developed, landlocked, island developing and most seriously affected countries;

(i) to enable developing countries to attain a greater degree of participation in international economic activities and to expand international co-operation.

16. TCDC clearly serves many other purposes, such as overcoming attitudinal barriers, increasing developing countries' confidence in each other's technical capabilities and enhancing the process of harmonization of their interests so as to take fully into account, within the context of the fundamental concept of solidarity, their specific subregional, regional and interregional characteristics, particularly by identifying priorities in such

fields as transport and communications, employment, development and exchange of human resources, as well as agriculture and industry".(1)

114. TCDC provides a framework for regional co-operation directed toward the achievement of national development goals, with the growth of means for exchange of information on all aspects of development underlining the whole programme. In fact, several of the 38 resolutions in the Buenos Aires Plan of Action relate to the development of information systems and information exchange. These have implications for Unesco's information activities carried out at the regional level and indeed for all projects facilitating the international flow of scientific and technical information, including ways of easing economic constraints on the provision and use of information, and the legal and administrative obstacles to its flow.

ISSUES RELATING TO REGIONAL CO-OPERATION ESPECIALLY AMONG DEVELOPING COUNTRIES

1. In the framework of the policies and needs of the Member States and the purpose and spirit of the New International Economic Order, the Conference may wish to examine how regional co-operation in the field of scientific and technological information could be expanded, intensified and better adapted to national needs, so that Member States, in regions with common problems and challenges, may closely co-operate in this field to achieve their national development goals.

2. In discussing actions related to the strengthening of regional co-operation which may be undertaken at the initiative of Member States, the Conference may wish to consider whether:

(a) in developing national and regional information programmes and systems, it is desirable that whenever viable, advantage be taken of bilateral and multilateral co-operative and collaborative arrangements in the economic, social, cultural, scientific and technological areas;

(b) in developing national and regional information programmes and systems, a Member State may seek the co-operation of other Member States in sharing experiences, resources, facilities and expertise in the spirit of the Buenos Aires Plan of Action for Technical Co-operation among Developing Countries (TCDC);

(c) developing countries should systematically exchange information pertaining to the transfer of technology for the benefit of development (terms and conditions of technology transfer, foreign investments, legislation and practices, activities of transnational corporations, criteria for selection of technologies, experiences, etc.).

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(1) See p. 5 in, UNITED NATIONS CONFERENCE ON TECHNICAL CO-OPERATION AMONG DEVELOPING COUNTRIES, Buenos Aires, 1978. - Report. - New York : United Nations, 1978. - 89 p. - (A/CONF.79/13/Rev.1).

3. The Conference may also wish to discuss appropriate actions to be undertaken at the international and regional levels to ensure that the needs and aspirations of Member States in scientific and technological information in various regions are appropriately reflected in the planning and programming of the international and respective regional organizations. In particular, the Conference may wish to consider whether:

(a) in planning and implementing its programme actions in scientific and technological information at the national, regional, or international levels, Unesco should endeavour to reinforce the Buenos Aires Plan of Action for TCDC and more particularly should ensure, wherever appropriate, that advantage be taken of existing or envisaged bilateral and multilateral arrangements for co-operation in the social, economic, cultural, scientific and technological areas;

(b) Unesco should promote investigative studies to be carried out with appropriate organizations on the environmental conditions (technological, social, political, legislative, economic and cultural) that are conducive to fruitful intra-regional and inter-regional co-operation in information and share the experience among interested Member States.

IX. UNESCO AND INTERGOVERNMENTAL AND NON-GOVERNMENTAL ORGANIZATIONS

UNISIST and the United Nations system

115. The strategies and programmes of action presented for consideration imply increased interaction and intersectoral collaborative effort between Unesco and other intergovernmental and non-governmental agencies and organizations. These interactions will become better defined as the action programmes are planned in detail and implemented.

116. The UNISIST Steering Committee and the Intergovernmental Council of the General Information Programme have regularly urged that the UNISIST programme take all possible steps to further harmonize information activities within the United Nations family and the Unesco General Conference at its nineteenth session instructed the Director-General "to take the necessary measures to ensure that the General Information Programme, particularly through the development of projects begun under the UNISIST programme, provides a conceptual framework for information systems devised by the agencies of the United Nations...".(1) In the perspective of the earlier discussion on UNISIST and the United Nations system (Part A, section III), some of the possible UNISIST roles in the United Nations system, with particular reference to the Inter-Organization Board for Information Systems (IOB), are briefly considered here.

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(1) See 19 C/Resolution 5.1.8 in, UNESCO. GENERAL CONFERENCE, nineteenth session, 1976. - _esolutions. - Paris : Unesco, 1977. - 182 p. - (Records ; volume 1.)

117. Voluntary co-operation in the enlightened self-interest of the participants is a basic UNISIST principle, and the question to be answered is how support can be provided to the Administrative Committee on Co-ordination and its Inter-Organization Board for Information Systems in their effort to extend this philosophy throughout the United Nations family. Whereas the Unesco programme is concerned in the first instance with information programmes which provide services and benefits to Member States, and provides a conceptual framework in which international information systems and programmes could co-operate, IOB is concerned in particular with information systems established by the agencies for "in-house" purposes.

118. There are three principal areas where the UNISIST principles and activities can be of assistance to the IOB in its efforts to strengthen and co-ordinate the information systems and services of the United Nations. These are: (a) the provision of a conceptual framework for inter-agency co-operation; (b) the interlinkage of United Nations information systems and services with other international, regional and national scientific and technological information systems now within the framework of UNISIST; (c) active participation in co-operative problem-solving efforts.

(a) The conceptual framework

119. Studies and consultation carried out over the past few years within the United Nations system have already brought about a general recognition that the UNISIST concept and programme principles have equal applicability to the United Nations family of agencies and to Member States. This was made clear in the report submitted by the Secretary-General on behalf of the Administrative Committee on Co-ordination, through the Economic and Social Council to the General Assembly: "There is within the United Nations system one information programme of a general nature designed to provide a conceptual framework for the establishment of national and international scientific and technological information systems and services to facilitate access to the world information resources and to create the necessary conditions for systems' interconnection and compatibility. This is Unesco's UNISIST".(1)

120. Since UNISIST is a programme designed to create conditions favourable to voluntary co-operation and not an operational system or service, it represents a positive force for systems development. The conceptual framework, described earlier in this report, with its emphasis on compatibility so that products and costs may be shared, is based on an economic appeal which, as we have seen, has already been recognized by individual United Nations agencies. The adaptability of this conceptual framework has already been demonstrated by its acceptance by national governments of countries with widely varying economic and social conditions, and its general acceptance within the United Nations could well be the greatest single contribution UNISIST could make.

(b) Interlinkage of United Nations information systems with other information systems

121. The internal information systems and services developed by agencies of the United Nations do not exist in a vacuum; they are inter-dependent with a multitude of other national, regional and international information systems in both

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(1) See p. 10 in, UNITED NATIONS. Economic and Social Council. - Establishment of a network for the exchange of technological information. - New York : United Nations, 1976. - 22 p. - (E/5839).

the public and the private sectors. They need to use information generated externally to the United Nations, and they need to ensure that their own products and services are disseminated as widely as possible throughout their Member States.

122. Unesco can therefore contribute to the efforts of IOB to ensure that the standards and guidelines used by the United Nations agencies in developing their information systems are compatible with those being developed for international use thereby facilitating effective communication and co-operation among the information systems of United Nations agencies, and with the scientific and technological information systems of United Nations Member States.

(c) Co-operation in problem-solving

123. As the IOB develops its programme for the harmonization and promotion of United Nations information systems and services, the need for multiple tasks will become evident. Technical questions must be explored, guidelines revised and developed, and studies made. Unesco has a rich experience in dealing with similar matters, and is widely known among experts in the field. It could and should participate actively in joint efforts within the United Nations to optimize its contributions to harmonization efforts.

124. As for the international network for the exchange of technological information with United Nations participation proposed by IATFIS, studies made up to the present have developed a strong case for the use of the UNISIST conceptual framework and principles in designing and implementing the network, and Unesco would of necessity be involved in its establishment.

125. Unesco is prepared to co-operate with other United Nations agencies involved, lending its experience and expertise to a joint programme. The three areas mentioned earlier, conceptual framework, systems' interconnection, and problem solving would also define the fields where UNISIST could make its optimal contributions to a United Nations sponsored global technological information network.

UNISIST and international and regional intergovernmental (other than the United Nations system) and non-governmental organizations

126. Several programmes and projects sponsored under UNISIST in association with international and regional intergovernmental and non-governmental organizations have been mentioned in Part A. The collaboration has usually been smooth and productive. Many possible activities for implementation by Unesco in collaboration with other organizations have been suggested earlier in the paper and it is hoped that the co-operation will be further strengthened in the coming years for the mutual benefit of Unesco and these organizations so that the growing information needs of Member States can be satisfied. The very nature of the programmes necessitates co-operation at the national, regional and international levels among the various organizations. There is also need for effective co-ordination among the organizations so that optimal use of the resources of Member States as well as of the organizations is ensured.

ISSUES RELATING TO UNISIST AND THE UNITED NATIONS SYSTEM, THE INTERNATIONAL AND REGIONAL INTERGOVERNMENTAL (IGOs) AND NON-GOVERNMENTAL ORGANIZATIONS (NGOs)

A. UNISIST and the United Nations system

1. With regard to Unesco, the Conference will doubtless wish to indicate the measures which should be taken to reinforce the Organization's current role in harmonizing information activities within the United Nations family. In the light of past experiences and in the context of changing environment and information needs, the Conference may wish to consider whether Unesco, through UNISIST, and in collaboration with appropriate organizations, can usefully continue:

(a) to initiate appropriate actions and play a catalytic role in the design and development of United Nations information systems;

(b) to provide a conceptual framework for the design and operation of other international information systems and to establish linkages among them;

(c) to provide for the evaluation of international information systems;

(d) to assist Member States in contributing to, participating in, and profiting from international information systems;

(e) to assist in problem solving and undertake joint investigations and programmes with other United Nations agencies in the S & T information field;

(f) make a major contribution to the follow-up of UNCSTD regarding programmes and actions for scientific and technological information at the service of development.

B. UNISIST and the international and regional intergovernmental and non-governmental organizations

2. On the basis of past experience and respecting the autonomous interests and goals of international and regional intergovernmental (other than the United Nations system) and non-governmental bodies, the Conference may wish to consider whether Unesco, in the framework of UNISIST, can usefully:

(a) continue and intensify co-operation with the NGOs and IGOs in the implementation of its programme at the national, regional and international levels;

(b) assist in technical problem solving and undertake joint investigations and projects in appropriate topics in the information field;

(c) provide a conceptual framework for the design and operation of information systems which the NGOs and IGOs may develop;

(d) contribute to the development of the professions represented in the NGOs.

ANNEX I

GLOSSARY

The following definitions are intended to explain the meaning given to a few specialized terms in this working document.

Abstract (Résumé): description, in a summary form, of the subject content of a document (e.g. journal article) without added interpretation or criticism, produced in order to facilitate users access to the information (through the condensation of the primary document) and its storage and retrieval.

Bibliographic control (Contrôle bibliographique): the process of identifying and recording in a standardized form the bibliographic data about documents published or available in a given area (subject field, country, region or world wide), and of gathering these bibliographic data so that they can be further used in order to identify and have access to the documents. See also Universal bibliographic control.

Bibliographic data (Données bibliographiques): series of data elements (e.g. author, title, date, place of publication, publisher, etc.) which provide a unique and unambiguous description of a document.
A given set of bibliographic data which concerns one document is called the bibliographic record of that document. The operation which consists of preparing bibliographic records is called cataloguing (catalogage).

Bibliographic record (Enregistrement bibliographique): see under Bibliographic data.

Bibliography (Bibliographie): a list of documents containing bibliographical descriptions of the documents. There are many kinds of bibliographies: by subject or by author or by geographical entity, general or specified, selective or exhaustive, current or retrospective, and so on.

Classification scheme (Classification): systematic list of terms used to represent and order the subject content of documents, and sometimes the documents themselves, in a unique way. The terms are arranged in a hierarchical structure, the various components of which are commonly represented by a special notation.

Consolidation (Consolidation): the process of merging, condensing, evaluating, analysing and synthetizing information or data on a given subject, collected from a variety of primary and secondary information sources. It produces tertiary information in the form of compendia, surveys, state-of-the-art reports, etc. It is also called information analysis. See also Primary documents and Tertiary documents.

Data (scientific and technical) (Données, scientifiques et techniques): the quantified observations and constructs of science and technology, in numerical or non-numerical form; also used to designate the tables, compendia and other special records through which they are made available to the interested community.

Data bank (Banque de données): information facility which collects data eventually in machine readable form, often from various sources and provide access to them.

The data delivered such as economic and social statistics, results of scientific experiments, are directly usable, i.e. they give an immediate answer and there is no need to refer to documents in order to find and/or evaluate them.

Data base (Base de données): organized set of data stored in a computer and which can be searched automatically. Data bases can contain usable raw data (e.g. stock lists, register of persons, physical properties of materials, etc.), or the list of addresses for finding such data (e.g. index of an archive file) or a description of the sources where the data can be found, in particular the bibliographic records of the documents containing the data.
Bibliographic data bases, which result from the accumulation of bibliographic records are often called simply "data bases", but they contain secondary information.

Evaluation (information ---) (Evaluation de l'information): testing, verifying the reliability or otherwise gauging the quality of scientific information and data. This activity involves the appropriate methods of scientific investigation (including experimentation) and is associated with consolidation and "reviewing" processes.

Extension officer (Responsable de vulgarisation): liaison, advisory or information officer who works within an extension service. They often have qualifications in both a particular subject and in communication techniques.

Extension personnel (Personnel de la vulgarisation): see under Extension service.

Extension service (Service de vulgarisation): (also called advisory/liaison or technical assistance service), service rendered by a body of professionals, often under or in co-operation with a government agency, who provide technical advice to specific groups of users with a view to helping them to identify and solve problems or to improve their productivity.
If government sponsored, such a service may be offered free of charge to the users.

Extension worker (Vulgarisateur): see Extension officer.

Format (Format): the structure of records, principally the machine readable ones. A format defines each data element contained in a given type of record, its sequence in the record and its physical characteristics (e.g. length, characters which may be used, etc.). A working (or internal) format specifies the structure of the records for computer storage and processing.
A communication format specifies the structure of the records for their transfer from one data base to another; it aims at simplifying and facilitating the conversion into various working formats.

Handling (information ---) (Manipulation de l'information): term generally used to designate the activities related to the acquisition, processing, storage, conservation, reproduction and distribution of information accomplished within the various types of information systems.

Indexing (Indexation): the process of describing and identifying a document in terms of subject content. During indexing concepts are extracted from documents by a process of analysis, then transcribed into the elements of the indexing tools, such as thesauri classification schemes, etc.

Information (scientific and technical) (Information scientifique et technique): the symbolic elements used for communicating scientific and technical knowledge, irrespective of their nature (numerical, textual, iconic, etc.), material carriers, form of presentation, etc. It refers both to the substance, or contents of documents and to their physical existence; the term is also used to designate both the message (substance and form) and its communication (act).
A distinction is made when needed between the raw information (facts, concepts, representations) and the documents in which it is recorded.

Information specialist (Specialiste de l'information): see Professions.

Infrastructure (Infrastructure): set of institutions, organizations, resources which supports the flow, handling and delivery of information from the generator to the user, including its acquisitions, processing, repackaging, and transfer. See Information systems.

Liaison service (information ---) (Service de liaison en information): service rendered by an information specialist attached to an information system or institution to a specific group of users by keeping a direct contact with the users, often through site visits, in order to help them to identify their information needs and provide them or refer them to the appropriate information sources, services or products. This activity is sometimes included in an extension service.

National focal point (Point de convergence national): governmental, or government-chartered, agency primarily concerned with questions of policy, planning and co-ordination of information systems development at the national level.

National information policy (Politique nationale d'information): a set of decisions taken by a government, through the appropriate laws and regulations, to orient the harmonious development of the information transfer activities, in order to satisfy the information needs of the country. A national policy needs the provision of concrete implementation means (financial, personnel, institutional).

National information system (Système national d'information): set of discipline-, mission- or function-oriented information systems, that is to say the information infrastructure, operating in a co-ordinated way and through the use of specified techniques of information handling; in accordance with the goals established by the national information policy, in order to satisfy the needs of the users at large.

(Needs (information ---)(Besoins d'information): information which is necessary for the proper accomplishment by an individual or a group of its activities (e.g. problem solving, decision-making, scientific research, agricultural or industrial production, service, education, culture, etc.).
It is important to note that information needs include more than the actual information requirements expressed by **users**. They also include non-expressed needs, future need, etc.

Network (information ---) (Réseau d'information): a set of interrelated information systems associated with communication facilities which are co-operating through more or less formal agreements and institutional arrangements, in order to jointly implement information handling operations, with a view to pooling their resources and better serving the **users**. They generally follow identical or compatible rules and procedures.
In modern practice, many information systems are in fact based upon networks and the two terms are often used interchangeably.

On-line retrieval (Recherche en ligne): the process of searching information or data stored in a computer to which one has an immediate access through a terminal. The software used may eventually allow for a man-machine interaction, i.e. a kind of dialogue between the inquirer and the data base.

Preservation (Préservation): specific measures undertaken for the protection, care, maintenance, repair or restoration, of documents.

Primary documents (Documents primaires) or primary literature: documents as they are produced by the author, that is, the original carrier of information.

Primary information (Information primaire): which is sometimes used for the two previous terms, refers to the original pieces of information, recorded or not.

Professions (information ---) (Professions de l'information): this term designates all the specialized occupations which may be held by information specialists at various levels (i.e. technical or professional) in relation to the handling or transfer of information, their study and teaching, e.g. archivists, librarians, documentalists, information officers, information systems managers, information science teachers, etc., with various special qualifications.

Records management (Gestion des documents courants): that area of general administrative management concerned with applying economy and efficiency principles in the creation, maintenance and use, and disposition of business and administrative files.

Referral service (Service d'orientation): the indication of sources (persons, institutions, publications, etc.) from which scientific information may be obtained on a given subject; mechanisms for switching users to such sources.

Repackaging (information ---) (Transformation, ou réassemblage de l'information): a rearrangement of the primary information obtained from various sources into tertiary information products or services tailored to the requirements of specific users group or individual user, e.g. compiling statistical tables on a given subject extracted from different statistical compendia or merging the data into a new statistical table. The degree of transformation may vary from a simple grouping to a full "re-writing" or transposition on a new medium (e.g. audio-visual) or with a more accessible language, according to the needs and characteristics of the users.

Repography (Repographie): the field which deals with the techniques and problems of document reproduction, in a variety of forms (e.g. duplication, photocopying, microcopying).

Restoration (Restoration): the specific techniques used for the repair of damaged primary documents and intended to contribute to their preservation.

Retrieval (information --- or data ---) (Recherche, ou récupération, de l'information ou des données): the process of searching and obtaining the information or data stored in a catalogue, index, secondary document or computer file. Information retrieval refers more frequently to the search of bibliographic data.

Secondary document (Document secondaire): document which gives information about, or the description of, a primary document or a set of such documents, e.g. bibliographic records, catalogues, bibliographies. They provide secondary information - that is information on (primary) information; it does not bring any new knowledge but just describes its sources.

Selective dissemination of information (SDI)(Dissemination sélective de l'information: DSI): the provision of secondary information on a current basis and according to an established time schedule (e.g. weekly, monthly, etc.) to an individual or a group of users, on their specific fields of interest, expressed by interest profiles (i.e. a standing list of structured search keys).

Sources (information ---) (Sources d'information): physical origin of the information or place where it can be found. It may be a person, an institution or a document. Sources may be primary, secondary or tertiary according to the nature of the information delivered (see under primary, secondary or tertiary document).

Sythesis (Synthèse): the process of presenting in a coherent whole, the already available scientific and technological information or data on a given field, topic or problem, in order to avoid as much as possible the overlaps or discrepancies in the presentation of information; it may underline gaps and orient further research. See also Consolidation.

System (information ---) (Système d'information): a set of documents, information specialists, material and financial resources, methods of information handling and of management which aims at allowing the transfer of information between producers or sources and users of information (which are better considered as being also part of the system).

Tertiary document (Document tertiaire) or tertiary literature: document resulting from the transformation (e.g. consolidation or repackaging) of the available primary and secondary information in order to express or represent it in a way which better fits the users needs. Physically the tertiary documents appear often as new ones and might be considered and processed in the same way as primary documents. The information they contain is called tertiary information.

Thesaurus (Thesaurus): in terms of function, it is a terminological control device used in translating the natural language of documents, indexes, or users, into a more constrained "system language" (documentation language, information language). In terms of structure, it is a controlled and dynamic vocabulary or semantically and generically related terms which covers a specific domain of knowledge.

Transfer (information ---) (Transfert de l'information): the set of successive operations by which "knowledge" is made available to different categories of users after its initial generation by the producers. It includes the production, i.e. recording of primary, secondary and tertiary information, the production of the corresponding documents, their distribution, storage, processing, dissemination, their search, access and exploitation, through all possible channels.
This notion covers the whole cycle, including generation and use of information and is, therefore, broader than information handling.

Union catalogue (Catalogue collectif): a common list of the holdings of two or more libraries or information centres. Such a list, which can cover books, periodicals or any other kind of document, is usually prepared in order to facilitate the location of, and access to, the documents, the operation of interlibrary loans and the rationalization of acquisitions.

UNISIST National Committee (Comité national de l'UNISIST): governmental, or government-chartered, committee established in order to serve as a standing and active link between the country and the UNISIST programme. It has to gather representatives of all the groups concerned by the programme (e.g. administrations, information systems, information professions, users). It should advise the national

focal point on the development of information activities within the country, the co-ordination of technical assistance, the elaboration of a national position on questions related to UNISIST or help in the establishment of the national focal point. It should contribute to the design and monitoring of the UNISIST programme on the one hand and to the awareness about it and its implementation within the country on the other.

Universal availability of publications (Accès universel aux publications): a programme launched by the International Federation of Library Associations and Institutions (IFLA) with the purpose of examining the obstacles which impede the availability of published documents within or among countries.

Universal bibliographic control (Contrôle bibliographique universel): a programme launched by the International Federation of Library Associations and Institutions (IFLA) for the promotion of a world-wide system for the control and exchange of bibliographic information.

Users (Utilisateurs): designates the whole community of those who might need, at one time or another, information. It includes policy-makers, decision-makers, research and development workers, scientists, engineers, professors and students at all levels, workers in agriculture, industry, the services, or in any other areas for which information can help to improve methods, products or results.
Though a comprehensive definition like the one above sounds most appropriate, the term is currently used to designate the persons who are actually making use of a given information service or product, those being likely to do so are called potential users.
It should be noted that users, in the broad sense, are at the same time, often producers of information and, in one way or another, for instance as tax-payers, the patrons of information systems; they are in fact closely associated with all aspects and phases of the information transfer process.

ANNEX II

ACRONYMS

ACC	Administrative Committee on Co-ordination (United Nations)
AGRIS	International Information System for the Agricultural Sciences and Technology (Food and Agriculture Organization)
ASEAN	Association of South East Asian Nations
ASIDIC	American Society of Information Disseminating Centres
BSO	Broad System of Ordering (International Federation for Documentation and Unesco)
BNIST	Bureau National de l'Information Scientifique et Technique (France)
CAB	Commonwealth Agricultural Bureaux
CARIS	Current Agricultural Research Information System (Food and Agriculture Organization)
CCF	Common Communication Format
CCITT	Comité Consultatif International Télégraphique et Téléphonique (International Telecommunication Union)
CISTI	Canada Institute for Scientific and Technical Information
CODATA	Committee on Data for Science and Technology (International Council of Scientific Unions)
CMEA	Council for Mutual Economic Assistance
COSTED	Committee on Science and Technology for Development (International Council of Scientific Unions)
DARE	Data Retrieval System for Documentation in the Social and Human Sciences (Unesco)
DBA	(Former) Division for Documentation, Libraries and Archives (Unesco)
ECOSOC	Economic and Social Council (United Nations)
EDP	Electronic Data Processing
EEC	European Economic Community
ESRIN/RECON	European Space Research Institute Remote Console (European Space Agency)
EURONET	European On-Line Information Network (European Economic Community)

EUSIDIC	European Association of Information Services, formerly European Association of Scientific Information Dissemination Centres
FAO	Food and Agriculture Organization
FID	International Federation for Documentation
IAC	Information Analysis Centre
IAEA	International Atomic Energy Agency
IATFIS	Inter-Agency Task Force on Information Exchange and the Transfer of Technology (United Nations)
ICA	International Council on Archives
ICSU	International Council of Scientific Unions
ICSU AB	International Council of Scientific Unions Abstracting Board
IERS	International Educational Reporting Service (Unesco, International Bureau of Education)
IFLA	International Federation of Library Associations and Institutions
ILO	International Labour Organisation
INFOTERM	UNISIST International Information Centre for Terminology
INFOTERRA	International Referral System for Sources of Environmental Information (United Nations Environmental Programme), formerly UNEP/IRS
INIS	International Nuclear Information System (International Atomic Energy Agency)
IOB	Inter-Organization Board for Information Systems (United Nations)
IRRD	International Road Research Documentation (Organization for Economic Co-operation and Development)
ISDS	International Serials Data System
ISIS	Integrated Set of Information Systems (International Labour Organisation and Unesco)
ISO	International Organization for Standardization
ISODOC	International Information Centre on Standards in Information and Documentation and Related Fields (International Organization for Standardization)
ISONET	International Information Network for Standards (International Organization for Standardization)

ISORID	International Information System on Research in Documentation (International Federation for Documentation and Unesco)
ISSN	International Standard Serial Number
ITU	International Telecommunication Union
MARC	Machine Readable Cataloguing
NATIS	National Information System
NFAIS	National Federation of Abstracting and Indexing Services (U.S.A.)
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
OEI	Oficina de Educación Ibero-americana
POGSI	Policy Group on Scientific Information (International Council of Scientific Unions)
POPINS	Population Information System (United Nations)
SDI	Selective Dissemination of Information
SITE	Satellite Instructional Television Experiment (India)
SPINES	International System for the Exchange of Information on the Application of Science and Technology to Development (Unesco)
SSIE	Smithsonian Science Information Exchange (U.S.A.)
TCDC	Technical Co-operation among Developing Countries
UAP	Universal Availability of Publications (International Federation of Library Associations and Institutions)
UBC	Universal Bibliographic Control (International Federation of Library Associations and Institutions)
UDC	Universal Decimal Classification (International Federation for Documentation)
UNCSTD	United Nations Conference on Science and Technology for Development
UNDP	United Nations Development Programme
UNIBID	UNISIST International Centre for Bibliographic Descriptions (Unesco)
UNIDO	United Nations Industrial Development Organization

UNIMARC	Universal MARC Format
VINITI	All-Union Institute of Scientific and Technical Information (USSR)
WDRC	World Data Referral Centre (Committee on Data for Science and Technology)
WFEO	World Federation of Engineering Organizations
WFEO/CEI	Committee on Engineering Information (World Federation of Engineering Organizations)